AN

INTRODUCTION

TO

Geography, Aſtronomy,

AND THE

USE OF THE GLOBES.

TO

WHICH ARE ADDED

A

Chronological Table

OF

REMARKABLE EVENTS, DISCOVERIES AND INVENTIONS

From the CREATION to the Year 1794;

And a large Collection of

QUESTIONS,

DESIGNED

For the Uſe of Young Perſons.

BY JOHN RIVETT, 17

MASTER OF THE ACADEMY, AT WYMONDHAM, NORFOLK.

THE SECOND EDITION, ENLARGED.

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1794.

BRITISH MUSEUM

THIS EDITION OF AN

INTRODUCTION

TO

GEOGRAPHY, ASTRONOMY,

AND THE

USE OF THE GLOBES,

IS

RESPECTFULLY INSCRIBED

TO THOSE

Ladies and Gentlemen,

WHO HAVE

HONOURED IT WITH THEIR NAMES,

BY

THEIR MOST HUMBLE,

AND

MOST OBEDIENT SERVANT,

JOHN RIVETT.

Wymondham,
March 24, 1794.

PREFACE.

THE *following compilation was originally made for the Young Gentlemen under the Author's care, and having found it uſeful in leading them through the moſt common and intereſting parts of Geography and Aſtronomy, he has ventured to publiſh it, in hopes that it may prove beneficial to the riſing generation.*

The ſubjects treated of are Geography, Aſtronomy and the Uſe of the Globes; to which are added a Chronological Table, and a large collection of queſtions.

The Geographical part begins by defining and naming ſuch terms and principles as are requiſite to be known; then follows a ſhort but comprehenſive view of the natural and political diviſions of land and water: and where it could be conveniently done, entertaining, as well as inſtructing, particulars are introduced.

The part which treats on Aſtronomy commences with ſuch definitions, principles and obſervations, as were judged neceſſary for elucidating its technical terms; theſe are ſucceeded by an account of the Solar Syſtem and Fixed Stars, in which are given the moſt pleaſing particulars of a ſcience that is acknowledged to be uſeful, intereſting and ſublime.

The diviſion allotted to the Uſe of the Globes, contains the moſt common and eaſy Problems; to which are annexed Notes, compriſing ſuch obſervations as were thought moſt likely to prove acceptable.

The Chronological Table exhibits a view of remarkable events in Univerſal Hiſtory, the principal diſcoveries in Geography and Aſtronomy, and an account of ſuch inventions as are in ſome degree connected with them, interſperſed with remarks intended to excite the genius and induſtry of youth to ſimilar purſuits, and to furniſh their minds with uſeful knowledge.

The Queſtions contain a reference to nearly all the principles laid down in the preceding parts, and are deſigned as a general Exerciſe and concluſion to the work; to learners, two, three, or more of them, may be propoſed at a time as a leſſon, to be performed by conſulting and comparing ſuch ſentences with each other, to which the queſtions under conſideration refer: and to thoſe who have ſome little knowledge of Geography and Aſtronomy, they will be found very uſeful in fixing their acquiſitions more firmly in their minds.

No Maps are inſerted, becauſe ſuch as are uſually given with performances of this kind are too ſmall to be of much uſe. The Student ought therefore to furniſh himſelf with Maps of the World, Europe, Aſia, Africa, America, &c. upon a large ſcale; which ſhould conſtantly be before him, and carefully conſulted when the leſſon requires it. And perhaps the beſt and readieſt way to obtain a knowledge of Local Geography would be to delineate ſuch County, Diſtrict or Diviſion of the Globe, as comes under conſideration; which method will be found extremely uſeful to thoſe who are deſigned for employments connected with ſurveying or navigation.

The limits aſſigned to the ſeveral Oceans are ſomething different from what are uſually found in books of Geography, and are ſuch as appear more natural and convenient for Geographical and Nautical Purpoſes.—And as a minute exactneſs in what relates to lengths, breadths, and other particulars in Geography, and to the diſtances, magnitudes, and motions of the planets in Aſtronomy, cannot be eaſily obtained, they are expreſſed in the neareſt round numbers, in order to aſſiſt the memory.

Such are the outlines of the little Treatiſe now offered to the ſervice of youth as an introduction to more copious works; in which the Author has endeavoured to be uſeful rather than original: conſcious that the merit of an elementary book conſiſts not in novelty of conjecture, but in accuracy of method and judicious ſelection; he has therefore choſen to be guided by authority, and uſed an unreſerved freedom in ſelecting from the works of his predeceſſors. But though his information has generally been drawn from the beſt ſources, he yet fears, that his treatiſe has many imperfections in point of execution, which he hopes will meet with ſome indulgence from the candour of a generous and diſcerning Public.

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ERRATA.

Page 2. line 30. read, *Seas.*—P. 3. l. 15. r. *Courſes*, and l. 29. after each, r. *Degree.*—P. 6. l. 23, dele, *the New Hebrides.*—P. 24. l. 13. r. *Oceans.*—P. 38. l. 24. r. 3500.—P. 49. l. 10. r. *Pole.*—P. 56. l. 27. r. *Diemen's.*—P. 64. l. 1. for *his* read *its.*—P. 85. l. 1. after *or*, r. *not.*—P. 112. l. 29. r. *Xenophon.*—P. 119. l. 25. r. *written.*—P. 130. l. 1. r. *Garveſton.*—P. 145. l. 17. and P. 149. l. 25. for *is*, r. *are.*—P. 153. l. 16. and 20. for *is* and *diſtance*, r. *are* and *diſtances.*—P. 161. l. 7. r. *Britain.*

GEOGRAPHY.

DEFINITIONS & PRINCIPLES.

GEOGRAPHY is a ſcience that gives a deſcription of the Earth, with all its parts, limits and particulars.

The form of the earth is globular, or nearly round like a ball; being 25,000 miles in circumference, 7970 in diameter or thickneſs, and ſurrounded with a body or ſhell of air, called the Atmoſphere.

The Earth is a planet revolving round the Sun at an immenſe diſtance, in an elliptical orbit or path, in the ſpace of a year, to produce the beautiful variety of ſeaſons; and at the ſame time turns round its axis every 24 hours, to cauſe the ſucceſſion of day and night. The former motion is called annual, and the latter diurnal.

The Globe is terraqueous, or compoſed of land and water; its whole ſurface contains near 200 millions of ſquare miles; of which one-third is land, and two-thirds water.

Land is divided into continents, iſlands, peninſulas, iſthmuſes, promontories, and mountains.

A Continent is a large tract of land containing ſeveral countries and kingdoms, not ſeparated from each other by the ſea, as Europe, Aſia, and Africa.

An Iſland is a ſmall tract of land entirely ſurrounded by water, as Great Britain, Ireland, and Madagaſcar.

A Peninſula is a part of land almoſt ſurrounded by water, as Crim Tartary, in Europe; Malacca, in Aſia; and California, in North America.

An Iſthmus is a narrow neck of land joining a peninſula to ſome other land, as Precop, which joins Crim Tartary to Little Tartary, and Darien, which unites North and South America.

A Promontory, Cape or Headland, is a part of land ſtretching into the ſea, as Cape Clear, in Ireland; Cape Finiſterre, in Spain; and the Cape of Good Hope, in Africa. —A coaſt or ſhore is that part of a country which borders on the ſea.

A Mountain is a part of land conſiderably higher than the adjacent country, as the Peak, in England; Plinlimmon, in Wales; and the Grampian Hills, in Scotland.—Some of the higheſt mountains are elevated more than three miles above the level of the ſea, as the Cordilleras in South America.

Water is divided into oceans, ſeas, gulphs, ſtreights, lakes, and rivers, which are of various depths, and correſpond in ſome meaſure with the different heights of the mountains.

An Ocean is a vaſt extent of water, without any entire ſeparation of its parts by land, as the Atlantic ocean.

A Sea is a part or branch of an ocean, confined by land, as the Mediterranean and Red ſea.

A Gulph, Bay or Creek, is an arm of the ſea or ocean, as the Gulph of Venice and Bay of Biſcay.

A Streight or Channel is a narrow paſſage which unites one part of the ſea or ocean to another, as the Streights of Dover between England and France; the Streights of Gibraltar, between Europe and Africa; and the Streights of Babelmandel leading into the Red ſea.

A Lake is a collection of water, moſt commonly ſurrounded by land, as Geneva, in Switzerland; Ladoga, in Ruſſia; Baikal, in Siberia; Zambre, in Africa; and the lakes Huron, Erie, &c. in North America.

A River is a ſtream of water riſing from a ſpring and running in a channel till it empties itſelf into ſome ocean, ſea or lake, as the Thames, Severn, and Trent, in England. The courſe of the greateſt rivers are in general obſerved to run either north or ſouth, or parallel to the equator.

GEOGRAPHERS, for the better determining the diſtances and ſituations of places on the globe, have imagined certain lines, circles and ſpaces, to be drawn upon it, to which they have given different names, as the axis, equator, ecliptic, meridians, tropics, &c.

The Axis of the earth is a right line paſſing through the center, about which its diurnal motion is performed. The poles of the earth are the extremities of this axis.

Circles are either greater or leſſer: a great circle divides the globe's ſurface into two equal parts, and the leſſer circle divides it into two unequal parts. All circles are divided into 360 equal parts, called degrees, and every degree into 60 equal parts, called minutes or geographical miles: each containing 69½ Engliſh miles.

The Equator or equinoctial is a great circle equidiſtant from the poles, dividing the globe's ſurface into the northern and ſouthern hemiſpheres. It is often called the line by mariners.

The Ecliptic is that great circle which croſſes the equator obliquely in two points, called the vernal and autumnal equinoxes. Over this line the ſun ſeems to paſs in the ſpace of 12 months, and it is divided into 12 equal parts, called ſigns, each containing 30 degrees.

A Meridian is a great circle, paſſing through the poles, cutting the equator at right angles, and dividing the globe's ſurface into the eaſtern and weſtern hemiſpheres. Every place has its particular meridian, and when it is oppoſite the ſun it is noon along that line from north to ſouth. When the meridians are drawn through every 15 degrees on the equator, they are called hour circles.

The meridian which paſſes through the equinoxes is called the equinoctial colure, and repreſents the eaſt and weſt points of the horizon: and that which paſſes through the points, where the ecliptic and tropics touch each other, is called the ſolſtitial colure, and repreſents the north and ſouth points of the horizon.

Parallels of latitude are leſſer circles drawn parallel to the equator; every place has its parallel of latitude: but thoſe generally drawn on globes and maps are the two tropics, the two polar circles, and others, through every ten degrees on each ſide of the equator, towards the poles.

The Tropics are each 23½ degrees from the equator; that on the north ſide is called the Tropic of Cancer, or ſummer ſolſtice; and the other the Tropic of Capricorn, or winter ſolſtice. The polar circles are juſt as far from the poles as the tropics are from the equator; that which has the north pole for its center is called the arctic circle, and the other the antarctic circle.

Latitude is the neareſt diſtance any place is ſituated from the equator, either north or ſouth, reckoned in degrees and minutes upon a graduated meridian, and ends at the poles, which are each 90 degrees from the equator.

Longitude is the diſtance any place is ſituated from ſome particular meridian, as that of London, reckoned in degrees and minutes upon the equator either eaſt or weſt, and ſometimes in hours, every 15 degrees being reckoned one hour.

The point in the heavens which is over our heads is called the Zenith, and that under our feet the Nadir.

The Horizon is a great circle 90 degrees diſtant from the zenith, dividing the upper from the lower hemiſphere. If the plane of the horizon paſſes through the eye of the obſerver it is called the ſenſible horizon; but if it paſſes through the center of the earth, it is called the rational horizon: when the ſun or any of the heavenly bodies appear above the eaſtern part of the horizon they are ſaid to riſe, and when they deſcend below the weſtern part, they are ſaid to ſet.

The circumference of the horizon is divided into 32 equal parts, called rhombs, or points of the mariner's compaſs: of which four are cardinal points, viz. north, ſouth, eaſt and weſt. The bearing of any place ſignifies the point of the compaſs on which it lies or is ſituated with reſpect to any other place.

The Tropics and polar circles divide the globe's ſurface into five broad ſpaces, called zones or belts, viz. one torrid, two temperate, and two frigid or frozen zones.

The Torrid Zone lies between the tropics, and is 47 degrees broad; from its being continually expoſed to the perpendicular rays of the ſun, the ancients thought it uninhabited, but experience has proved it to be cooled and refreſhed by long nights, great dews, and regular rains; and that it is in all reſpects the moſt fertile tract on the globe.

This zone contains the greateſt part of South America, Africa, and ſome part of Aſia, moſt of the Eaſt and Weſt India iſlands, the north part of New Holland, and ſome part of the Pacific, Atlantic, and all the Indian ocean.

The two Temperate Zones are ſituated between the tropics and polar circles, each being 43 degrees broad, and are named north and ſouth. They enjoy a moderate degree of heat and cold, on account of the ſun's rays falling obliquely upon them.

The north Temperate Zone contains almoſt all Europe, Aſia, and North America, the iſlands of Japan, Newfoundland, Great Britain, Ireland, the Azores, Canaries, &c. great part of the Pacific and Atlantic oceans, and the whole of the Baltick and Mediterranean ſeas.

The ſouth Temperate Zone comprehends part of South America, Africa, and New Holland, the iſlands of New Zealand, the New Hebrides, &c. and great part of the ſouthern ocean.

The two Frigid Zones are contained between each polar circle and its pole, and are 47 degrees broad; they are intolerably cold, and nearly involved in darkneſs during the winter.

The North Frigid Zone contains Greenland, part of Lapland, Siberia, Nova Zembla, &c. which are but thinly inhabited. The ſouth frigid zone is but little known.

Climates are ſpaces on the earth's ſurface, contained between two parallels of latitude, and are of unequal breadths. From the equator each way to the polar circles they are formed by the longeſt natural day (viz. from ſun-riſing to ſun-ſetting) in one, exceeding that of another by half an hour: and from the polar circles to the poles they are reckoned by days and months.

There are 24 climates between the equator and each polar circle, and 6 between each polar circle and its pole, making in all 60, viz. 30 north and 30 ſouth.

THE ANCIENTS diſtinguiſhed the inhabitants of the earth by the names of Amphiſcii, Heteroſcii, Periſcii, Periœci, Antœci, and Antipodes, according to the falling of their noon-tide ſhadows, their ſituations, and the different apparent motions of the celeſtial bodies to them.

The Amphiſcii inhabit the torrid zone, and are ſo called, becauſe they caſt their ſhadows at one time of the year towards the north, and at another time towards the ſouth. When the ſun is in their zenith they have no ſhadow, and are called Aſcii.

The Heteroſcii live in the temperate zones, and caſt their ſhadows all one way; in north latitude, northward; and in ſouth latitude, ſouthward.

The Periſcii are the miſerable inhabitants of the frigid zones; their ſhadows in the ſpace of one day are directed to all points of the compaſs.

The Periœci are thoſe who live in the ſame latitude, but on oppoſite meridians; they have the ſame ſeaſons and length of days, but oppoſite hours. The inhabitants of the poles have no Periœci.

The Antœci are thoſe who live in the ſame latitude and on the ſame meridian, but in different hemiſpheres; they have noon and midnight at the ſame time; the length of the day to one is always equal to the length of the night to the other, and the ſeaſons are contrary. Thoſe who live at the equator have no Antœci.

The Antipodes are thoſe who live diametrically oppoſite, or walk feet to feet; their latitudes, longitudes, ſeaſons, days, and nights, are contrary to each other.

A right Sphere is that poſition of the earth where the equator paſſes through the zenith, and the poles are in the horizon: Thoſe that live upon the equator have this poſition. They enjoy a perpetual equinox, their days and nights being always 12 hours long; the ſtars in both hemiſpheres are viſible to them, and the ſun is twice in the year directly over their heads, and twice in the ſolſtices; conſequently they have two ſummers and two winters, as alſo two ſprings and two autumns; the ſummer being when the ſun is vertical to them.

An oblique Sphere is that poſition of the earth where the equator and horizon make an oblique angle: thoſe that live between the equator and poles have this poſition. One pole is above and the other below their horizon; the height of the elevated pole is always equal to the latitude of their ſituation. They ſee only part of the heavens; the greater latitude any place is in, the longer are the longeſt days, and the ſhorter the ſhorteſt nights. At the tropics the longeſt natural day is 13½ hours, and at the polar circle 24 hours.

A parallel Sphere is that poſition of the earth where the horizon coincides with the equator: Thoſe that live at the poles have this poſition. They never ſee but one-half of the heavens;

heavens, which is continually revolving round them. In this ſphere, one half of the ecliptic is above the horizon, and the other half below it; ſo that at the poles there can be but one day and night throughout the year.

A Map is the repreſentation of the earth's ſurface delineated on a plane, according to the laws of projection, and is either general or particular. A general map gives a view of an entire hemiſphere, and a particular map exhibits a part of the earth's ſurface leſs than a hemiſphere. Thoſe repreſenting ſeas and ſea coaſts, are called charts.

There are two methods of projecting the circles in general maps, viz. ſtereographic and orthographic: but the firſt is generally preferred, on account of its repreſenting the hemiſphere with all the parts entire, and from its ſhewing the latitudes and longitudes of places exactly as the globe itſelf. This projection is known by the meridians being drawn nearer each other about the middle of the map than they are in approaching the circumference of it; ſo that the parts near the center are leſs than they ought to be. In the orthographic projection, this order of the meridians is reverſed, and the parallels of latitude are ſtraight lines.

Charts are conſtructed either from conſidering the earth as a large extended flat ſurface, or as a ſphere, and are principally adapted to the practice of navigation. When conſtructed upon the former principle they are called plane charts; and when upon the latter, globular, or mercator's charts.

Maps are laid down and proportioned to a certain ſcale, which is always taken from the degrees of latitude. The top of a map is North, the bottom South, the right hand Eaſt, and the left Weſt; unleſs there be drawn a Flower-de-luce to ſhew the contrary. The degrees of latitude are always reckoned on the eaſt and weſt ſides of a map; and thoſe of longitude, on the equator, or the north and ſouth ſides.

Sea Coaſts, are repreſented by a thick ſhaded line; rivers, by large ſerpentine lines; foreſts, by little trees; mountains, by riſing ſhadows; lakes, by ſhaded coaſts; marſhes, by ſhaded beds; ſands and ſhallows, by dotted beds; near harbours, the depth of the water is expreſſed by figures, denoting fathoms; the courſe of rivers, currents, and the direction of the wind, by little arrows; roads, by double lines; and rocks, by little croſſes.

The diviſions of kingdoms and countries are repreſented by chain lines, which are ſometimes ſtained with different colours; provinces and ſubdiviſions, by dotted lines; cities and great towns, by a little round o, and ſometimes a church, with houſes about it; the names of provinces are written in large capitals; ſmaller diviſions in ſmall capitals; cities, in roman characters; and towns, in italics.

THE GRAND

DIVISIONS OF LAND.

NATURE has divided the terrene part of the globe into the eaſtern and weſtern continents, and a great number of iſlands: the former extend from north to ſouth, and the latter are widely diſperſed in the different oceans and ſeas. The Eaſtern Continent (or, as it is called the Old World) contains Europe, Aſia, and Africa; and the Weſtern Continent (or, the New World) North and South America: and theſe are politically divided into Regions, Empires, Kingdoms, Republics, States, Provinces, Cantons, Principalities, Electorates, Dukedoms, Marquiſates, Palatinates, Baronies, Dioceſes, Circuits, Counties, Cities, Towns, Pariſhes, Villages, &c. for the ſake of order and good government.

A ſhort but comprehenſive deſcription of the ſeveral Continents and Iſlands, with their political diviſions, as they exiſt at this time; is as follows:

EUROPE.

EUROPE.

Europe is ſituated in the northern hemiſphere, between 36 and 72 degrees of north latitude, and between 10 degrees of weſt and 65 of eaſt longitude, from the meridian of London. It is bounded on the North, by the Frozen Ocean; on the Eaſt, by Aſia; on the South, by the Mediterranean Sea, which parts it from Africa; and, on the Weſt, by the Atlantic Ocean, which ſeparates it from America. Being 3000 miles in length, from Cape St. Vincent, in Portugal, to the mouth of the River Oby, in the North-eaſt part of Ruſſia; and 2500 miles in breadth, from the North Cape, in Norway, to Cape Metapar, in the Morea, the moſt ſouthern promontory in Europe.

Europe contains 153 millions of inhabitants, is better peopled and cultivated, and contains more cities, towns, and villages, than any other quarter on the globe, in proportion to its ſize: there being very few tracts of land that are uninhabited or uncultivated. In the north, the climate is very ſevere, but, in the middle and ſouthern provinces, it is extremely mild and pleaſant.

The following Table contains the political diviſions of Europe, with their ſeveral lengths, breadths, chief cities, &c. Where E. ſtands for Empire, K. Kingdom, R. Republic, St. State, P. Principality, Pr. Provinces, L. Length, and B. Breadth.

	Kingdoms.	*L.*	*B.*	*Chief Cities, &c.*
Britiſh Emp.	K. England	380	300	*London*, a rich commercial City.
	K. Scotland	300	150	*Edinburgh*, famous for its Univerſity.
	P. Wales	130	100	*Cardigan*, a large populous town.
	K. Ireland	280	160	*Dublin*, a very beautiful and rich City.
	K. Norway	1000	300	*Bergen*, a large Port and ſtaple Town.
	K. Sweden	800	500	*Stockholm*, ſtands upon ſeven rocky Iſlands.
	E. Ruſſia	1500	1100	*Peterſburgh*, a large flouriſhing City.
	K. Denmark	240	180	Copenhagen, a good port, with little commerce.
	K. Poland	700	680	*Warſaw*, ſtands in the center of Poland.
	K. Pruſs. Dom.	600	350	*Berlin*, a large manufacturing City.
	E. Germany	600	500	*Vienna*, a noble and ſtrong City.
	K. Bohemia	300	250	*Prague*, famous for its noble bridge.
Netherlands.	R. Holland	150	100	*Amſterdam*, eminent for its commerce.
	Pr. Flanders	200	200	*Bruſſels*, a populous and lively City.
	R. France	600	500	*Paris*, ſituated in the Iſle of France.
	K. Spain	700	500	*Madrid*, ſtands in a large ſandy plain.
	K. Portugal	300	100	*Liſbon*, trades chiefly in wine.
	St. Italy	700	400	*Florence*, one of the fineſt Cities in Italy.
Part of Italy.	K. Naples	280	200	*Naples*, ſtands near Mount Veſuvius.
	Pope's Dom.	240	120	*Rome*, a large magnificent City
	R. Venice	170	90	*Venice*, ſtands upon 72 iſlands.
	K. Sardinia	130	60	*Turin*, a ſmall but ſtrong City.
	R. Genoa	160	25	*Genoa*, a rich trading City.
	R. Lucca	28	15	*Lucca*, ſtands in a pleaſant plain.
	R. St. Marino	—	—	*St. Marino*, ſituated on a rock.
	R. Switzerland	260	100	*Bern*, in a mountainous country.
	R. Geneva	13	11	*Geneva*, ſtands upon the Rhone.
	K. Hungary	300	200	*Preſburgh*, a ſtrong fortified City.
Turkiſh Emp.	Turkey	600	420	*Conſtantinople*, a very large and fine City.
	R. Raguſa	—	—	*Raguſa*, about two miles in circuit.
	Little Tartary	380	240	*Kaffa*, a conſiderable Port Town.
	Greece	400	240	*Athens*, ſituated in a pleaſant country.

Norway is a cold uncomfortable country, belonging to Denmark. Poland is a diſmembered kingdom, in which the Ruſſians and Pruſſians claim a part. Pruſſia, as named in the table, is ſituated in Poland, Germany, Bohemia, Switzerland, and the Netherlands, and the King's reſidence is at Berlin, a city in Germany.

Germany is divided into nine circles, or diſtricts, in which are veſted the right of electing the Emperor; here are 300 Sovereign Princes and States, moſt of which are arbitrary in their reſpective territories, but with regard to the empire at large, they form one collective political body, called the Diet, (which meets at the city of Ratiſbon), at the head of which is the Emperor.

Flanders is divided amongſt the Auſtrians, French, and Dutch. Italy is divided into ſeveral Principalities and Republics, which are independent of each other, having diſtinct forms of government, and different intereſts. Geneva is a ſmall Republic, on the confines of Italy and France, and is conſidered as one of the Swiſs Allies.

Europe, though the leaſt of the continents, is far preferable to the others, on account of the temperature of the air and the fertility of the ſoil; which, from the induſtry of the inhabitants, produces all the neceſſary comforts of life. It is diſtinguiſhed for the comelineſs, ſtrength, wiſdom, courage, learning and ingenuity of its inhabitants, the excellency of their governments, and the equity of their laws; but above all for the eſtabliſhment of the Chriſtian Religion throughout the continent, except that part inhabited by the Turks, who are diſciples of Mahomet the impoſtor.

Europe does not contain many mines of gold, ſilver, or precious ſtones, neither can it boaſt of its groves of ſpices, nor ſources of perfumes: but it produces abundance of corn, pulſe, fruit, wine, &c. and its wonderful and extenſive commerce, makes the riches of every nation its own. It has alſo the advantage of every other country in poſſeſſing the moſt valuable and uſeful animals, without being annoyed with wild beaſts, dreadful ſerpents, or noxious inſects.

MOUNTAINS.—The principal mountains are the *Dofrefield*, between Norway and Sweden. The *Zimnopoias*, or Girdle of the Earth, in the northern part of Ruſſia. The *Carpathian*, which divide Hungary and Tranſylvania from Poland. The *Alps*, which ſeparate Italy from France and Germany. The *Appenines*, extending from north to ſouth through Italy. The *Pyrenees*, dividing France from Spain. The *Vauge*, in France, which divide Lorrain from Burgundy and Alſace. Alſo *Olympus*, *Pindus*, and *Parnaſſus*, in Turkey: beſides ſeveral burning mountains, or volcanoes, as *Hecla*, in Iceland; *Veſuvius* and *Stromboli*, in Naples, and *Mount Ætna*, in Sicily. It is very remarkable, that the greateſt part of the volcanoes in our hemiſphere are ſituated on iſlands, or very near the ſea.

RIVERS.—The moſt remarkable rivers are, the *Wolga*, which flows from the north part of Ruſſia, through Perſia, Georgia and Tartary, a courſe of 3000 miles, and falls into the Caſpian Sea. The *Viſtula* flows from Sileſia, paſſes by Cracow and Warſaw, and falls into the Baltic ſea, below Dantzic. The *Danube* flows from the Black Foreſt, in Germany, and after running 1600 miles, enters the Black Sea by ſeveral channels. The *Elbe* flows from Sileſia, and falls into the Britiſh ſea about 70 miles below Hamburgh; this river is navigable for great ſhips further from its mouth than any other in Europe. The *Rhine* flows from Switzerland, and forms the lake of Conſtance, in the ſouthern part of Germany; afterwards receives the *Necker*, *Maine*, and *Moſelle*, paſſes by *Mentz*, *Cologne*, &c. and then falls into the Britiſh ſea by Holland, through ſeveral channels.

The River *Rhone* flows from the Alps, through the Lake of Geneva, and then falls into the Mediterranean Sea, near Marſeilles. The *Po* flows from the Alps, through Piedmont, in Italy, to the Gulph of Venice. The *Scheld* flows from Picardy, runs by Cambray, Valenciennes, Tournay, Ghent, Antwerp, &c. and falls into the Britiſh Sea by two channels. The *Loire* riſes in the Cevenne Mountains, in France, and falls into the Bay of Biſcay below Nantes. The *Tagus* flows from Arragon, in Spain, paſſes through Portugal, and forms the harbour of Liſbon, at which city it is about 3 miles wide.

ISLANDS.—In the Northern Ocean, about 800 miles from Norway, lie *Iceland*, *Eaſt* and *Weſt Greenland*, or *Spitz-bergen*; lower down are the 24 *Faro Iſles*, 300 miles weſt of Norway, all barren, cold, and uncomfortable countries, ſubject to the King of Denmark.

In the Atlantic Ocean, near the coaſt of France, Flanders, and Holland, is ſituated the BRITISH EMPIRE, conſiſting of *Great Britain* and *Ireland*; and the leſſer Iſles of *Shetland*, *Orkney*, *Hebrides*, *Angleſea*, *Man*, *Scilly*, *Wight*, &c. which ſurround them.

In the Baltic Sea, near its entrance, are the Iſlands of *Zealand*, *Funen*, *Falſter*, *Laland*, *Langland*, *Bornholm*, &c. which form part of the kingdom of Denmark, the city of Copenhagen being in the iſland of Zealand. The iſlands of *Gothland*, *Oeland*, *Rugen* and *Aland* are ſituated on the coaſt of Sweden. Near the Gulph of Finland are *Oſel* and *Dagho*, ſubject to Ruſſia: and *Uſedom* and *Woollen*, on the north coaſt of Germany to Pruſſia.

In the Mediterranean Sea, near the Spaniſh coaſt, are *Ivica*, *Majorca* and *Minorca*, ſubject to Spain. Near Italy is the mountainous iſland of *Corſica*, ſubject to the Engliſh. Lower down is *Sardinia*, which gives a royal title to the Duke of Savoy, the King's reſidence is at Turin, a city in Italy. At the ſouthern extremity of Italy lies the iſland of *Sicily*, ſubject to the King of Naples. And a little below this iſland lies *Melita*, or *Malta*, famous for its Knights; on this iſland St. Paul was ſhipwrecked.

In the Adriatic Sea, or Gulph of Venice, are *Corfu*, *Cephalonia*, *Luſiena* and *Zant*, famous for their currants and grapes, ſubject to the Venetians.

In the Archipelago and Levant Seas, are *Candia*, where ſtands Mount Ida, now no better than a barren rock. *Negropont*, where the Turkiſh Gallies lie. *Samos*, the birth place of Pythagoras. *Patmos*, where St. John wrote the Revelations. *Paros*, noted for the beauty and whiteneſs of its marble. *Rhodes*, famous for having contained the braſs Coloſſus, one of the ſeven wonders of the world. *Cyprus*, which contains Mount Olympus. Alſo *Scio*, *Tenedos*, *Lemnos*, *Santorin*, &c. all which are ſubject to the Turks, and form part of ancient and modern Greece.

GREAT BRITAIN.

Great Britain is the largeſt iſland in Europe, and contains England, Scotland, and the principality of Wales; being inhabited on the north by the Scots, on the ſouth and eaſt by the Engliſh, and on the weſt by the Welſh.

England is much the largeſt diviſion of the iſland, and contains 40 counties, 25 cities and 2 univerſities, viz. Oxford and Cambridge. The counties are divided into ſix circuits, and two judges are appointed to viſit each, every ſpring and autumn, for the adminiſtration of juſtice.

Wales is the ſmalleſt diviſion of the iſland, and lies on the weſt of England, and may be called a peninſula in the Iriſh ſea, between the mouths of the rivers Severn and Dee. It contains 12 counties and 4 cities, but no univerſity: all the counties, except three, touch the ſea coaſt in ſome part of their boundaries. Wales is divided into four circuits, and was incorporated with England in the year 1282.

Scotland is ſituated on the north of England, and is parted from it by the rivers Tweed and Solway: the whole country is ſo interſected by inlets of the ſea, that every houſe is within 50 miles of ſalt water. It contains 33 counties or ſhires, and 4 cities, which are univerſities, viz. Edinburgh, on the Frith of Forth; Glaſgow, near the Clyde; Aberdeen, on the Dee; and St. Andrew's, near the Britiſh Ocean.

The counties are divided into Highlands and Lowlands, the 13 moſt northern ones, on account of their being very mountainous, are called Highlands, and the reſt Lowlands, from their being more flat and level. Scotland was united to England in the year 1706, by which act of Union, they are limited to ſend no more than 16 Peers, and 45 commoners, to ſit in the Britiſh Parliament.

With reſpect to the climate of this iſland, it enjoys but a ſcanty ſhare of the genial influence of the ſun; its atmoſphere is chill and moiſt, and the weather ſo very capricious and changeable, that the natives frequently experience all the four ſeaſons within the compaſs of a day. The ſoil in general is good and well cultivated, ſo that it produces great quantities of corn and feeds vaſt herds of cattle.

The face of the country is various: England is full of riſing grounds and gentle ſlopes, but contains very few mountains; Wales and Scotland are more irregular and romantic, containing many lofty mountains, craggy rocks, and deep narrow dells, which are, however, interſperſed with ſome vales of great fertility.

The lakes in Great Britain are very few and inconſiderable, but it is watered with many copious ſtreams, which not only fertilize the ſoil, but add greatly to the improvement and proſperity of its commerce.

The eſtabliſhed religion in England and Wales is the Proteſtant Epiſcopacy, and in Scotland, the Preſbyterian: but all others are tolerated. The Eccleſiaſtical diviſion of England and Wales is into two provinces, viz. Canterbury and York; each containing Dioceſes, Archdeaconries, rural Deaneries and pariſhes.

The government of Great Britain is a mixed Monarchy, conſiſting of King, Lords and Commons.

The King is the fountain of juſtice, and the ſupreme head of the church; he has the power of ſending and receiving Ambaſſadors, of making war and peace, of raiſing and regulating fleets and armies, of coining money and making it current, of pardoning crimes, &c.

The Houſe of Lords conſiſts of the Peers of the Realm, viz. the Arch-biſhops, the Biſhops, Dukes, Marquiſſes, Earls, Viſcounts, and Barons.

The Houſe of Commons conſiſts of men of property, who are choſen by the different counties, cities and boroughs in England, Scotland and Wales, to repreſent them in Parliament, and are in number 558.

The Privy Council is a very auguſt and honourable aſſembly. The members are choſen by the King, and ſworn to adviſe him according to the beſt of their judgment, and to keep his counſels ſecret.

Beſides the High Court of Parliament there are 4 other Courts of Judicature, viz. the Court of Chancery, which is deſigned to mitigate the rigour of the law, and to judge according to equity.—The Court of King's Bench, in which are tried all matters determinable at common law, between the King and his ſubjects.—The Court of Common Pleas, in which are debated cauſes between ſubject and ſubject.—And the Court of Exchequer, in which are tried all cauſes relating to the King's revenues, cuſtoms, fines, &c.

The

THE FOLLOWING TABLE
CONTAINS THE CIRCUITS, COUNTIES, &c. IN
ENGLAND AND WALES.

In which the Cities are printed in Italics and M. ſtands for Members ſent to Parliament.

ENGLAND.

	Counties.	*L.*	*B.*	*M.*	*Cities and Chief Towns.*
Home Circ.	Eſſex	48	54	8	Chelmsford and Colcheſter.
	Hertfordſhire	25	35	6	Hertford, St. Albans and Ware.
	Kent	36	58	10	*Canterbury* and *Rocheſter*.
	Surry	27	37	14	Southwark and Kingſton.
	Suſſex	28	70	20	*Chicheſter* and Brighthelmſtone.
Norfolk Circ.	Buckinghamſhire	50	16	14	Buckingham and Ayleſbury.
	Bedfordſhire	35	20	4	Bedford and Ampthill.
	Huntingdonſhire	24	24	4	Huntingdon and St. Ives.
	Cambridgeſhire	50	25	6	Cambridge, *Ely* and Newmarket.
	Suffolk	30	58	16	Bury, Ipſwich and Woodbridge.
	Norfolk	45	70	12	*Norwich*, Lynn and Yarmouth.
Oxford Circ.	Oxfordſhire	48	26	9	*Oxford*, Witney and Banbury.
	Glouceſterſhire	60	26	8	*Glouceſter* and Cirenceſter.
	Worceſterſhire	30	20	9	*Worceſter* and Kidderminſter.
	Monmouthſhire	24	20	3	Monmouth, Chepſtow and Newport.
	Herefordſhire	36	36	8	*Hereford* and Leominſter.
	Shropſhire	50	40	12	Shrewſbury and Colebrook Dale.
	Staffordſhire	55	24	10	*Litchfield* and Stafford.
	Berkſhire	25	50	9	Reading, Newbury and Windſor.
Midland Circ.	Warwickſhire	50	32	6	*Coventry*, Warwick and Birmingham.
	Leiceſterſhire	35	45	4	Leiceſter and Melton Mowbray.
	Derbyſhire	50	38	4	Derby, Cheſterfield and Matlock.
	Nottinghamſhire	50	20	8	Nottingham and Newark.
	Rutlandſhire	15	12	2	Oakham and Uppingham.
	Northamptonſhire	60	20	9	*Peterborough* and Northampton.
	Lincolnſhire	70	40	12	*Lincoln*, Boſton and Spalding.
Weſt Circ.	Hampſhire	42	38	26	*Wincheſter* and Portſmouth.
	Wiltſhire	50	40	34	*Saliſbury*, Wilton and Devizes.
	Dorſetſhire	36	50	20	Dorcheſter, Poole and Blandford.
	Somerſetſhire	45	65	18	*Briſtol*, *Bath* and *Wells*.
	Devonſhire	70	64	26	*Exeter*, Plymouth and Dartmouth.
	Cornwall	90	30	44	Launceſton and Falmouth.
North Circ.	Yorkſhire	80	100	30	*York*, Leeds, Sheffield and Hull.
	Durham	37	50	4	*Durham* and Sunderland.
	Northumberland	70	40	8	Newcaſtle and North Shields.
	Lancaſhire	60	50	14	Lancaſter and Liverpool.
	Weſtmoreland	40	40	4	Appleby, Kendal and Milthorpe.
	Cumberland	80	40	6	*Carliſle* and Whitehaven.
	Middleſex	17	22	8	*London* and *Weſtminſter*.
	Cheſhire	30	40	4	*Cheſter* and Macclesfield.

WALES.

		Counties.	*L.*	*B.*	*M.*	*Cities and Chief Towns.*
North Wales.	*N.E.Cir.*	Flintſhire	28	10	2	*St. Aſaph*, Flint and Holywell.
		Denbighſhire	48	18	2	Denbigh, Ruthin and Wrexham.
		Montgomeryſhire	36	36	2	Montgomery and Welſhpool.
	N.W.Cir.	Angleſea Iſle	20	22	2	Beaumaris and Holyhead.
		Caernarvonſhire	45	20	2	*Bangor* and Caernarvon.
		Merionethſhire	36	34	1	Dolgelly and Harlech.
South Wales.	*S.W.Cir.*	Radnorſhire	26	31	2	Radnor and Preſtean.
		Brecknockſhire	29	34	2	Brecknock, Built and Hay.
		Glamorganſhire	26	48	2	*Landaff*, Cardiff and Swanſey.
	S.E.Cir.	Pembrokeſhire	27	30	3	*St. David's* and Haverfordweſt.
		Cardiganſhire	40	20		Cardigan and Aberiſtwith.
		Caermarthenſhire	20	45	2	Caermarthen and Kidwelly.

Middleſex and Cheſhire are not comprehended in the circuits, the former being the ſeat of the Supreme Courts of Juſtice, and the latter a county Palatine, enjoying municipal laws and privileges.

Great Britain is well ſituated for trade, and its commerce has been improving for a long ſeries of years, and is at this time arrived at an amazing height. The principal commercial companies are, the Eaſt India, the South Sea, the Royal African, the Turkey, the Ruſſian, and the Hudſon's Bay Company.

The number of fleeces ſhorn annually in England, upon an average, is eſtimated at twelve millions, which form the baſis of an extenſive branch of commerce. The tin and lead mines in Cornwall, are ſuppoſed to employ 100,000 men; and the coal mines in Durham, Northumberland, and the neighbouring counties, are worked by a vaſt number of hands, and produce another great article of trade.

The ſhipping of Great Britain is immenſe, and her ſailors the moſt hardy and expert in the world; according to the beſt computations, more than 8000 ſail of large ſhips are employed in the commerce of the iſland: of which, 800 are engaged in the coal trade only, and thoſe uſed in coaſting, or carrying goods from one part of the iſland to another, are eſtimated at 2000.

The exports are reckoned at 7 millions ſterling annually, and the imports at 5; above one million of which is re-exported: ſo that if this calculation be true, Great Britain gains annually 3 millions in trade, and nearly one half of its commerce centers in the port of London.

The productions and exports are corn, cattle, wool, tin, copper, lead, iron, coals, hops, ſaffron, flax, fiſh, fowls, butter, cheeſe, and different kinds of fruits: and manufactures of various kinds are eſtabliſhed in almoſt every county; as, the woollen, in Norwich, Exeter and Colcheſter; cordage for the navy, in Dorſetſhire; glaſs and braſs wire, in Briſtol; and hardware, in Birmingham and Sheffield.

Mancheſter is noted for its beautiful cottons, dimities, tickens, checks, velvets, &c. as are ſeveral towns in Yorkſhire; Wilton and Kidderminſter are famous for their carpets, which exceed thoſe of Turkey in beauty. All which, as well as a great number of other towns, produce vaſt quantities of goods for exportation, of ſuch excellent quality, that they are unrivalled and univerſally ſought after.

The military force of this kingdom, (including troops and garriſons in Ireland, Gibraltar and America) conſiſts of about 40,000 ſoldiers and 15,000 ſailors; but in time of war there have been in Britiſh pay, natives and foreigners, above 150,000 land forces and 100,000 ſailors, beſides 42,000 militia. And the Britiſh navy, during the war of 1756, was able to cope with all the other fleets in Europe.

The Foreign poſſeſſions of the King of England are, the Electorate of Hanover, in Germany; the ſtrong fortreſs of Gibraltar, in Spain; the provinces of New Britain, New Scotland, Canada, &c. in North America; a great number of valuable iſlands in the Eaſt and Weſt Indies; ſome ſettlements on the Coromandel and Malabar Coaſt, in India; ſeveral forts and factories on the banks of the Rivers Senegal and Gambia, in Africa; and ſeveral of the new diſcovered iſlands, in the Southern and Pacific Ocean.

ASIA.

Asia is ſituated between the equator and 80 degrees of north latitude, and between 25 and 180 degrees of eaſt longitude, from the meridian of London. It is bounded on the north, by the Frozen Ocean; on the eaſt, by the Pacific Ocean; on the ſouth, by the Indian Ocean; and on the weſt, by the Red Sea, Mediterranean Sea, and Europe; being about 4800 miles in length, from the Dardanelles on the weſt to the eaſtern ſhore of Tartary; and about 4400 miles in breadth, from the moſt ſouthern part of Malacca, to the moſt northern cape of Nova Zembla. It contains 500 millions of inhabitants, and lies in all climates from the frozen wilds of Siberia, to the ſultry regions of India.

The following are the principal regions this continent is divided into; ſome of which are but imperfectly known to Europeans, particularly Arabia, Perſia, China, and Tartary, the laſt is reckoned the moſt regular convex ſurface on the globe, and lies very high.

Regions.	*L.*	*B.*	*Chief Cities, &c.*
Tartary	4000	2400	*Aſtracan*, ſtands on the Caſpian Sea.
China	1450	1260	*Pekin*, ſituated in a fertile plain.
Mogul Emp.	2000	1500	*Calcutta*, contains an Engliſh factory.
India	2000	1000	*Siam*, one of the fineſt Cities in Aſia.
Perſia	2300	1100	*Iſpahan*, ſeated near the River Zenderhend.
Arabia	1300	1200	*Mecca*, the birth place of Mahomet.
Turkey	1000	800	*Aleppo*, a large trading City.

Tartary contains a great part of Aſia, and is divided into three parts, viz. Ruſſian, Chineſe and Independent Tartary, the limits of which are unknown. China is parted from Tartary by a wall 1500 miles long, 20 feet high, and broad enough to admit 5 or 6 horſemen a-breaſt.

India is divided into many kingdoms and provinces, ſome of which are unknown to Europeans; the commerce of this country is ſought by all the trading nations in the world, but the greateſt part of it is now centered in England, though that of the Dutch is ſtill very conſiderable.

Arabia is divided into three parts, viz. Arabia the Deſert, Arabia the Stony, and Arabia the Happy; the latter is in ſubjection to the Turks, and the former are under no particular government.

Turkey is divided into many provinces, as Syria, Natolia, Holy-land, Chaldea, Armenia, Georgia, &c. where the various tranſactions recorded in the ſcriptures happened.

Aſia exceeds Europe and Africa in the extent of its territories, the ſerenity of its air, and in the number, variety and richneſs of its productions. The ſoil near the ſea coaſt is very fertile, but in the interior parts it is an immenſe ſand, which, when agitated by the wind, rolls like the troubled ocean. Agriculture is much neglected, notwithſtanding which, the ſouthern parts produce, almoſt ſpontaneouſly, corn, pulſe, herbs and fruits of various kinds.

It contains gold and other rich metals, precious ſtones, ivory, and various kinds of drugs, ſpices and gums. The tea plant is peculiar to China, of which is raiſed enough to ſupply the whole globe. Here are a variety of tame and wild animals, alſo ſerpents, ſcorpions, and a great variety of inſects, many of which are extremely troubleſome, and the bite of ſome of them mortal.

The inhabitants are extremely indolent and effeminate, great enemies to ſcience, politeneſs and liberty; very ſuperſtitious, and much given to idolatry, moſt of them being Mahometans and Pagans. The prevailing form of government is deſpotic Monarchy; the Arabs and a few tribes of Tartars (who live in hordes, and wander from place to place in ſearch of paſture for their cattle), are the only people that can be ſaid to be independent and free.

Mountains.—The principal Mountains are the *Naugracut*, which ſeparates Indoſtan from Tibet. The *Balagate*, which runs from north to ſouth almoſt the whole length of India, and is ſo high that it cauſes the rains to begin later on the Coromandel Coaſt, than on that of the Malabar, by ſtopping the weſtern monſoons. The *Daghiſtan*, which includes *Caucaſus*, *Taurus*, *Ararat*, *Horeb*, *Sinai*, &c. extends from the weſt of Aſia, through Perſia to India.

Rivers.—The chief Rivers are the *Indus*, *Ganges*, and *Oxus*, which flow from the mountains that divide India from Tartary. The firſt falls into the Gulph of Scindi, below the city of Tata; the ſecond after receiving many other rivers, falls, by various ſtreams, into the Bay of Bengal; on its banks the Engliſh have many ſettlements: and the third ſeparates Uſbec Tartary from Perſia, and falls into the Caſpian Sea, or Lake of Salt-water. The *Euphrates* flows near the city of Erzerum, in Turkey, and unites with the *Tigris*, then paſſes by the city of Baſſora, and falls into the Perſian Gulph. The *Oby* flows from Kalmuck Tartary to the Northern Ocean, and ſerves as one of the boundaries of Europe.

Islands.—In the Northern Ocean, near the coaſt of Siberia, lies the barren iſland of *Nova Zembla*, which is covered with ſnow nine months in the year; and on the eaſtern coaſt of Tartary lie the *Kurile* and *Kamſchatka* iſles, diſcovered and claimed by the Ruſſians.

In the Pacific Ocean, 150 miles eaſt of China, lie the iſlands which form the Empire of *Japan*; the inhabitants are famous for making curious lacquer ware. South Eaſt of theſe are the *Marian*, or *Ladrones*, 12 in number: the chief are *Guam* and *Tinian*, on which Anſon landed. The Chineſe Iſlands are *Formoſa* and *Ainan*, or *Hainan*, in the Gulph of Cochin China, they contain nothing remarkable. About 300 miles ſouth eaſt of China are the *Philippines*, 1100 in number, the chief is *Manilla*, or *Luconia*, which is extremely fruitful, and affords a profitable trade to the Acapulco ſhips belonging to Spain: on the mountains in ſome of theſe iſlands, where water is moſt wanted, there are canes and trees which ſupply it. Twenty-five leagues ſouth of the *Philippines*, are the *Moluccos*, or *Clove Iſles*, and the *Banda*, or *Nutmeg Iſles*; amongſt which may be claſſed the iſlands of *Amboyna*, *Celebes*, *Gilolo*, and *Ceram*, all producing ſpice, the trade of which is monopolized by the Dutch; in theſe iſlands the inhabitants build their houſes on large poſts for their ſecurity againſt venomous animals.

In the Indian Ocean are ſituated the *Sunda Iſlands*, as *Borneo*, *Sumatra*, *Java*, *Bally*, *Banca*, &c. In *Sumatra* the Engliſh Eaſt India Company have two ſettlements, viz. *Bencoolen* and *Fort Marlborough*, from whence they bring their chief cargoes of pepper. And in *Java* the Dutch have ſettlements, particularly at *Batavia* and *Bantam*, where they live in great ſplendour.

Near the Bay of Bengal are the ſmall and numerous *Andaman* and *Nicobar Iſles*; they furniſh ſhips which touch at them with tropical fruits. *Ceylon*, or the *Cinnamon Iſle*, is ſituated near Cape Cormorin; it is one of the richeſt and moſt fertile iſlands on the globe, the greateſt part of it is ſubject to the Dutch, whoſe chief port town is *Trincomale*. The *Maldives* and *Lackdives* are ſituated near the ſame Cape, they are very numerous, but can be called little elſe than rocks, ſome of them however are noted for fine cocoa trees. The iſlands of *Bombay* and *Goa* are ſituated on the Malabar coaſt; the former belongs to the Engliſh, and the latter to the Portugueſe, who have ſettlements on the weſtern part of *Decan*, or *Viſapour*, in Indoſtan.

Theſe iſlands, and the ſouthern parts of India, are known by the general name of the Eaſt Indies, where the Engliſh, Dutch, French, Portugueſe, &c. have many ſettlements, from whence they draw great riches.

AFRICA.

AFRICA is a peninſula of a prodigious extent, joined to Aſia by a neck of land at Egypt, about 60 miles over, called the Iſthmus of Suez. It is ſituated between 37 degrees of north and 34 of ſouth latitude, and between 17 degrees of weſt and 52 of eaſt longitude, from the meridian of London. Being about 4300 miles in length, from Cape Bona, in the Mediterranean, to the Cape of Good Hope; and about 3500 miles in breadth, from Cape Verd to Cape Guardafui, near the Streights of Babelmandel. It is bounded on the north by the Mediterranean and Levant Seas; on the ſouth by the Southern Ocean; on the eaſt by the Red Sea and the Indian Ocean; and on the weſt by the Atlantic and part of the Southern Ocean. It contains 150 millions of inhabitants, and lies chiefly in the Torrid Zone, the equator running through the middle of it.

This country is ſo very little known to Europeans, that it is impoſſible to fix, with any tolerable degree of preciſion, its modern diviſions and dimenſions: thoſe exhibited in the following Table are taken in a very large ſenſe, many of them containing nations that are independent of each other.

Regions.	*L.*	*B.*	*Chief Towns, &c.*
Egypt	600	250	*Grand Cairo*, a large unhealthy city.
St. Barbary	2000	700	*Algiers*, ſtands on the ſea oppoſite Majorca.
Biledulgerid	2500	350	*Dara*, in a barren and mountainous country.
Zaara	2400	850	*Tegeſſa*, ſituated in a ſandy deſert.
Negroland	2200	840	*James' Fort*, an Eng. Fact. for gum, ſlaves, &c.
Guinea	2500	360	*Cape Coaſt Caſtle*, an Eng. Fact. for gold, ivory, and ſlaves.
Ethiopia	——	——	*Gondar*, ſituated upon a high hill.
Ajan	900	300	*Brava*, a pretty good ſea port.
Zanguebar	1400	350	*Melinda*, in a rich and fertile country.
Monomotapa	960	660	*Monomotapa*, in a very temperate climate.
Monemugi	900	660	*Chicova*, in a hot unhealthy climate.
Sofola	480	300	*Sofola*, near a river of the ſame name.
Ter.-de-Natal	600	350	No towns in this country.
Caffraria	700	660	*Cape Town*, a Dutch Factory.

Barbary includes the kingdoms or countries of Morocco, Fez, Algiers, Tunis, Tripoli, &c. each capital bears the name of the ſtate to which it belongs; the inhabitants are known by the name of Moors, and are tributary to the Turks.

Guinea is diſtinguiſhed into the Gold Coaſt, Ivory Coaſt, and the Slave Coaſt. The Portugueze are in poſſeſſion of the eaſt and weſt coaſt, from the Tropic of Capricorn to the Equator. And the Dutch have ſettlements in Caffraria, or the land of the Hottentots, particularly at the Cape, where ſhips bound for India put in for refreſhments.

Our imperfect knowledge of this country, in ſome meaſure, ariſes from the extreme danger of travelling in it; on account of the intolerable heat, vaſt barren ſands, and the dreadful ſcarcity of water. No continent produces a greater number or variety of animals, both wild and tame, or of ſerpents and inſects, than Africa.

The natives conſiſt of whites and blacks, though the former are of a tawny or ſwarthy complexion; they are tall, ſtout and ſtrong, naturally fierce and cruel, and many of them abſolutely ſavage; in ſhort, almoſt the whole country may be called a neſt of barbarians, living in huts and tents, and wandering from place to place like the wild Arabs. Their religion in general is Mahometaniſm and Paganiſm, and their form of government is every where Monarchical.

The fertility of the ſoil is very great, but it has no medium, being either perfectly barren, or extremely luxurious. It is much to be lamented that this vaſt country, which ſtands as it were in the center of the other three quarters of the globe, and has 10,000 miles of ſea coaſt, with ſome noble rivers penetrating into its very center, ſhould be almoſt deſtitute of ſhipping, trade and merchants; though it produces a great variety of uſeful articles, ſuch as rice, maize, figs, olives, raiſins, oranges, lemons, citrons, dates, pomegranates, ſenna, civet, ſugar, indigo, pepper, gold-duſt, pearls, elephants teeth, black cattle, horſes, ſheep, goats, hogs, &c. What little trade is now carried on, is on the coaſts of Egypt, Barbary, Guinea, Negroland, and at the Cape, which is chiefly managed by the Jews reſiding at thoſe places.

MOUNTAINS.—The principal mountains are, the *Atlas*, which runs the whole length of Barbary, and gives name to the neighbouring ocean, called the Atlantic Ocean. The Mountains of the *Moon*, between Abyſſinia and Monomotapa, which are always covered with ice and ſnow. *Sierra Leona*, or the Mountains of the Lions, which divide Nigritia from Guinea, and extend as far as Ethiopia; they were called by the ancients the Mountains of God, on account of their being ſubject to thunder and lightning. In Teneriffe, one of the Canary Iſles, is a Mountain called the *Peak*, in the form of a ſugar-loaf, ſaid to be nearly 3 miles high, and about 15 miles in circumference.

RIVERS.—The moſt remarkable Rivers are, the *Nile*, which divides Egypt into two parts; it overflows its banks periodically, and fertilizes the ſoil through which it paſſes, then diſcharges itſelf into the Levant Sea by 7 mouths, after a prodigious courſe from Abyſſinia. The *Niger*, a very rapid ſtream, after a courſe of 2800 miles from eaſt to weſt, diſcharges itſelf into the Atlantic Ocean, by three branches, viz. *Rio Grande*, *Gambia*, and *Senegal*, upon the banks of which the Engliſh, French, Dutch, and other Europeans have ſettlements, where they trade with the natives.

ISLANDS.—In the Indian Ocean, near the entrance of the Red Sea, lie *Babelmandel* and *Socotora*, famous for producing aloes. More ſouthward is *Madagaſcar*, the largeſt of the African Iſlands, abounding in corn and cattle, and inhabited by all nations. Near this iſland lie the 5 *Comora Iſles*; alſo *Bourbon* and *Mauritius*, the former belongs to the Portugueſe, and the latter to the French: between theſe iſlands and the continent, the European ſhips generally paſs in their way to *Bombay*, in the Eaſt Indies.

In the Atlantic Ocean, about 1200 miles from Africa, and 1800 from South America, lies the pleaſant iſland of *St. Helena*, where the Engliſh Eaſt India ſhips ſtop to get freſh water and proviſions; if a ſhip overſhoots this iſland in its paſſage to Europe, it cannot recover it again on account of the ſtrong ſouth-eaſt wind which conſtantly blows here. About 600 miles north-weſt of *St. Helena* lies the iſland of *Aſcenſion*, belonging to the Portugueſe, where ſhips ſtop to furniſh themſelves with turtle or tortoiſes.

Not far from the equinoctial line, and in the Gulph of Guinea, between Congo and Benin, are ſituated *St. Matthew*, *St. Thomas*, *Anabo*, *Prince's Iſland*, and *Fernandopo*, ſubject to the Portugueſe, and furniſh ſhipping with freſh water and proviſions as they paſs by.

Three hundred miles weſt of Cape Verd, are ſituated the *Cape Verd Iſles*, about 20 in number, ſubject to the Portugueſe. *St. Jago*, *Bravo*, *Mayo* and *Fogo* are the moſt fertile, the others being only barren and uninhabited rocks. Within cannon ſhot of the Cape lies the ſmall iſland of *Goree* belonging to the French.

About 150 miles ſouth-weſt of Morocco lie the *Canaries*, or *Fortunate Iſles*, belonging to the Spaniards. The principal of which are *Palma*, *Hiero*, *Gomera*, *Teneriffe*, *Grand Canaria*, *Fuerteventura*, *Ferro* and *Lancerota*: they are all extremely fruitful, and famous for thoſe rich wines, to which they give the name of *Canary*, whereof the greateſt part is exported to England.

The *Madeiras* are a cluſter of iſlands about 100 miles north of the *Canaries*, and as many weſt of the town of Sallee, in Morocco; the chief are *Madeira* and *Porto-Santo*, ſubject to the Portugueſe: they produce ſugar, delicious fruits and excellent wine, the greateſt part of which is exported to the Weſt Indies.

Nearly at an equal diſtance from Europe, Africa and America, are ſituated the *Azores*, or *Weſtern Iſles*, 9 in number, ſubject to the Portugueſe; they are named *Santa Maria*, *St. Michael*, *Tercera*, *St. George*, *Gracioſa*, *Fayal*, *Pico*, *Flores*, and *Corvo*; all extremely fertile in corn, wine, fruits, &c. but often ſuffer from earthquakes and inundations: it is ſaid, that no poiſonous or noxious animals breed on theſe iſlands, and that if carried thither, they will expire in a few hours.

AMERICA.

America is ſituated in both hemiſpheres, between 80 degrees of north, and 56 of ſouth latitude, and between 35 and 136 degrees of weſt longitude, from the meridian of London. Being about 9000 miles from north to ſouth, and in ſome places 3600 miles from weſt to eaſt; it conſiſts of two large peninſulas, joined together by a neck of land, about 1500 miles long and 60 broad, called the Iſthmus of Darien, or Panama.

It is bounded on the north by unknown parts; on the eaſt by the Atlantic Ocean; on the ſouth by the Southern Ocean; and on the weſt by the Pacific Ocean. It contains 160 millions of inhabitants, has two ſummers and a double winter, and enjoys all the climates the earth affords. North America is from 2750 to 5000 miles, and South America from 4650 to 8600 miles diſtance from London.

There are many diſtricts in this vaſt country with which we are but little acquainted; particularly on the north and weſt of the European Settlements, and in the interior parts of South America. All that is known is principally divided amongſt the Engliſh, the Spaniards, the Portugueſe, the French and the Dutch, according to the following Table.

NORTH AMERICA.

	Nations.	L.	B.	Chief Cities, &c.
Engl.	New Britain	850	750	No town in this cold & barren country.
	Canada	600	200	*Quebec*, is 170 miles from Montreal.
	New Scotland	350	250	*Halifax*, ſtands upon Chebucto Bay.
	United States	1800	700	*Philadelphia*, the fineſt city in America.
Spain.	E. & W. Florida	500	440	*St. Auguſtine*, ſituated on the ſea coaſt.
	Louiſiana	1200	640	*New Orleans*, ſtands on the Miſſiſippi.
	New Mexico	2000	1000	*St. Fee*, a handſome rich town.
	Old Mexico	2000	600	*Mexico*, ſtands in the middle of a lake.

SOUTH AMERICA.

	Nations.	L.	B.	Chief Cities, &c.
Spain.	Terra Firma	1400	700	*Panama*, famous for its fairs.
	Peru	1800	600	*Lima*, ſubject to earthquakes.
	Amazonia	1200	960	No towns in this fertile country.
F.	Guiana	780	480	*Cayenne*, a rich ſea-port town.
P.	Braſil	2500	700	*St. Sebaſtian*, commands a noble harbour.
Spain.	Paraguay	1500	1000	*Buenos Ayres*, a conſiderable trading town
	Chili	1200	500	*St. Jago*, ſituated in a beautiful plain.
	Ter. Magellanica	1400	460	No towns in this inhoſpitable country.

This continent was unknown to the ancients, and even to the moderns, till the year 1492, when it was diſcovered by Columbus, after which many Europeans became adventurers in theſe new regions, and took poſſeſſion of many extenſive countries.

At the back of the European Settlements the native Indians live unmoleſted and enjoy their original manners and ſimplicity. They form themſelves into tribes, or nations, have no fixed habitations, but travel from place to place in ſearch of the neceſſaries of life, and hide themſelves in the boſoms of almoſt impenetrable and boundleſs foreſts. They go naked in ſummer, but in winter cover themſelves with the ſkins of animals. Their chief buſineſs is hunting and war, and their religion groſs idolatry, worſhipping the ſun, moon and ſtars.

The ſoil in this continent is various, and the air is found to be colder and moiſter than in other countries in the ſame latitude. It produces moſt of the metals, minerals, plants, fruits, trees and wood to be met with in other parts of the world; alſo diamonds, pearls, emeralds, and other valuable ſtones; wheat, rice, barley, indigo, ginger, ſugar, cochineal, tobacco, barillas, cotton, hides, furs, &c. and contains a variety of uſeful animals, alſo wild beaſts, monſtrous ſerpents, and a numerous tribe of beautiful inſects.

MOUNTAINS.—The principal Mountains are the *Apalachian* or *Alligany*, which lie on the back of the American States, ſeparating them from Canada and Louiſiana. The *Andes*, or *Cordilleras*, which extend from the Iſthmus of Darien to the Streights of Magellan, a length of near 4300 miles; they are reckoned the higheſt mountains on the globe, their ſummits are always covered with ſnow, even in the midſt of the torrid zone: many of them are *volcanoes*, and the greateſt part of them contain mines of the moſt precious metals.

RIVERS.—In North America is the River *St. Laurence*, which runs a courſe of 700 miles, at its mouth it is 90 miles wide, and navigable for large ſhips 400 miles from the ſea; into it falls the rivers *Out-awais*, *St. John's*, *Trois Rivieres*, &c. it has its ſource in the lake *Ontario*, and on its banks ſtand the cities of Quebec and Montreal. The *Miſſiſippi*, with its windings, runs a courſe of 4500 miles, and flows into the Gulph of Mexico, in its courſe it receives the *Cherokees*, *Mobile*, *Pearl River*, and many other large ſtreams; like the *Nile* and *Niger*, at a certain ſeaſon, it overflows its banks and becomes extremely rapid.

In South America is the river *Oronoque*, a noble ſtream running a courſe of 2000 miles on the north ſide of the equator and diſcharging itſelf by many ſtreams into the Atlantic Ocean, oppoſite the iſland of Trinidad. The *Amazon* has its ſource in Peru, not far from the Pacific Ocean, and runs eaſtward more than 3000 miles, in its courſe it receives a prodigious number of great and navigable rivers, and then falls into the Atlantic Ocean: it is eſteemed the largeſt river on the globe. In *Paraguay* are the three rivers, *Paragua*, *Uragua* and *Parana*, which, after running many miles, unite near the ſea, and form the famous Rio de la Plata, below Buenos Ayres.

ISLANDS.—The Iſlands ſituated round America are very numerous, particularly thoſe in the Gulph of Mexico, called the Weſt Indies, in contradiſtinction to the ſouth-eaſt parts of Aſia, called the Eaſt Indies.

At the mouth of the River *St. Laurence* lies the large mountainous and foggy iſland of *Newfoundland*, famous for its cod fiſhery. Lower down is a cluſter of ſmall iſlands, ſurrounded by rocks, called the *Bermudas*, or *Summer Iſles*, they are ſubject to England, and their diſtance from the Land's End, in Cornwall, is computed to be near 4500 miles.

The Weſt India Iſlands lie in the form of a ſemi-circle, ſtretching from the coaſt of Florida to the river Oronoque, and are divided into the *Bahamas*, the *Great* and *Little Antilles*, and the *Caribbees*; the latter are diſtinguiſhed by the ſailors into the Leeward and Windward Iſles, and are at a medium about 4000 miles from London.

The *Bahama*, or *Lucay Iſles*, extend along the coaſt of Florida quite down to the iſland of Cuba, and are ſaid to be 500 in number; of which only 12 are of any note, the reſt being mere rocks, and the whole of them thinly inhabited, they are ſubject to England, and were the firſt fruits of Columbus's diſcoveries.

The *Great Antilles* are *Jamaica*, a very fertile iſland, about 4500 miles ſouth weſt of England, to which it belongs. *Cuba*, a large and important iſland belonging to Spain. *Hiſpaniola*, or *St. Domingo*, extremely fertile and belongs to the Engliſh and Spaniards. *Porto Rico*, a beautiful iſland diverſified with woods, plains and rivers, ſubject to Spain. The *Virgin Iſles*, are very ſmall and ſituated at the eaſt end of *Porto Rico*.

The *Little Antilles* are ſituated on the coaſt of Terra Firma, the largeſt are *Curaſſou*, *Bonaire*, and *Aruba*, all naturally barren and unhealthy iſlands, ſubject to the Dutch.

Of the *Caribbees*, the *Leeward Iſles*, are *St. Chriſtopher's*, *Antigua*, *Nevis*, *Dominica*, *Barbuda*, *Guadaloupe*, *Deſeada*, &c. ſubject to the Engliſh. *Euſtatia* and *Saba*, to the Dutch, and *St. Thomas* and *Santa Cruz* to the Danes. The Windward Iſles are *Martinico*, *St. Vincent*, *Granada*, *Barbadoes*, *St. Lucia* and *Tobago*, ſubject to the Engliſh, and *Trinidad* and *Margaretta* to the Spaniards.

The ſeaſons in the Weſt Indies have ſcarce any other diſtinction than that of the rains; the trees are green the whole year, froſts and ſnow are unknown, and even hail extremely rare. The rainy ſeaſon begins in July and laſts till the latter end of September, during which time they have hurricanes and tempeſts that are often dreadful beyond conception. Moſt of theſe iſlands produce ſugar, cotton, coffee, ginger, aloes, ſpices, tobacco, rum, moloſſes, different kinds of wood and tropical fruits in great abundance.

On the coaſt of South America, near Braſil, are the iſlands of *Fernando*, *St. Barbara* and *St. Catharine's*, ſubject to the Portugueſe. At the extremity of South America are *Falkland Iſlands*; alſo *Terra-del-Fuego*, or Land of Fire, a barren rock occaſionally inhabited by Indians from the continent: and in the Southern and Pacific Oceans, near the American Coaſt, are the ſmall iſlands of *Chiloe*, *Juan Fernandes*, *Mocho*, *St. Mary's*, and the *Gallipagoes*, all belonging to the Spaniards.

NEW DISCOVERIES.—Our knowledge of the globe has been conſiderably augmented by the diſcoveries of the Ruſſians and Britiſh navigators, particularly in the Pacific and Southern Oceans; a ſhort account of which is as follows:—

A diſcovery has lately been made, that all the weſtern coaſt of America, between the latitude of 48 and 57 degrees north, is no continued tract of land, but a chain of iſlands, which has never been explored; and that theſe conceal the entrance to a vaſt inland ſea, like the Baltic, which ſeems to be full of iſlands.

The *Northern Archipelago* conſiſts of four groups of iſlands ſituated between Kamſchatka, in Aſia, and the weſtern coaſt of North America, they are as yet but little known.

The *Sandwich Iſles*, 12 in number, are ſituated near the Tropic of Cancer, at one of which (named *Owhy-hee*) the celebrated Captain Cook fell a ſacrifice to the fury of a nameleſs ſavage.

The *Marqueſas* are a group of ſmall iſlands nine degrees ſouth of the equator.

Otaheite and the *Society Iſles*, are in 17 degrees of ſouth latitude, and 150 degrees of eaſt longitude; they contain ſeveral good bays and harbours.

The *New Hebrides*, *New Caledonia*, *Botany Iſle* and the *Iſland of Pines*, are ſituated between 14 and 25 degrees of ſouth latitude.

The *Friendly Iſles* are about 20 in number, all fertile and pleaſantly ſituated in 21 degrees of ſouth latitude.

New Zealand is in 40 degrees of ſouth latitude, and conſiſts of two large iſlands, ſeparated by a paſſage about 5 leagues broad, called Cook's Streight.

New Holland is the largeſt iſland on the globe, the eaſtern part of it called *New South Wales*, was taken poſſeſſion of, in his Majeſty's name, by Captain Cook, and now forms a part of the Britiſh dominions; in latitude 34 degrees ſouth is *Botany Bay*, where a colony is formed of the convicts ſentenced to tranſportation.

New Guinea is ſeparated from *New Holland* by a paſſage called Endeavour Streight, this iſland affords a variety of delightful proſpects, and is interſperſed with groves of cocoa-nut trees, plantains, &c.

New Britain, *New Ireland*, *New Hanover* and the *Admiralty Iſles*, are to the north of *New Guinea*, and ſtill more north are the *Pelew Iſlands*, diſcovered in the year 1783.

Moſt of theſe iſlands are thinly inhabited, and for want of cultivation have nothing particular to recommend them; the inhabitants are in general of a chocolate colour, very ignorant, and little better than ſavages.

HAVING taken a general view of the ſeveral continents and iſlands on the globe, I ſhall now mention the ſources from whence our knowledge of them ariſes.

The parts of the earth's ſurface known to the ancients were confined within very narrow limits. On the weſt, the Atlantic Ocean, and the Britiſh Iſles were their utmoſt bounds. Of the northern countries they had very imperfect notions. The weſtern frontier of China ſeems to have bounded their knowledge on the eaſt. And how far their diſcoveries extended with regard to Africa, cannot certainly be known; ſome are of opinion that they were acquainted with the whole coaſt, having ſailed round it from the Red Sea to the Mediterranean.

For the extenſion of the ancient limits of the Earth we are greatly indebted to the moderns, who have gradually improved geography by their travels, commerce and conqueſts. The diſcovery of the ſouthern parts of Africa was reſerved for the Portugueſe in the fifteenth century, in attempting to find a paſſage to the Eaſt Indies, round the Cape of Good-Hope, which they accompliſhed. The paſſage being thus opened, ſeveral European nations, deſirous of ſharing in the rich commerce of the eaſt, ſent their ſhips into the Indian ſea, where they diſcovered the Aſiatic Iſlands, China, and penetrated to the empire of Japan. And ſince that time the Ruſſians have furniſhed us with what we know of the eaſtern parts of Aſia.

The prodigious length of the voyage to India, round the ſouthern extremity of Africa, induced Columbus to attempt the diſcovery of a ſhorter tract. And about the end of the fifteenth century he croſſed the Atlantic Ocean; but inſtead of the Indies, he found America.

This diſcovery of that great man animated others in the ſame noble cauſe, voyages were made acroſs the different parts of the Atlantic Ocean, and new countries were every day diſcovered. Projects were alſo formed for circum-navigating the globe, which was firſt performed by Magellan's ſhip in the year 1519, at which time he diſcovered the ſtreight that bears his name, between South America and Terra-del-Fuego. This voyage demonſtrated the ſphericity of the earth, and the exiſtence of the Antipodes, which had been ſo ſtrenuouſly denied by the tongue of ſuperſtitious bigotry.

Magellan was followed by Drake, Cavendiſh, and others, who diſcovered many iſlands, and extended our geographical knowledge; and laſtly, the great Captain Cook, in his three voyages, has done more towards completing the ſcience of geography than any other man. In his firſt voyage he diſcovered the Society Iſlands, determined the inſularity of New Zealand, and explored the eaſtern coaſt of New Holland: in the ſecond, he traverſed the Southern Ocean, as far as 70 degrees ſouth, in almoſt every direction: and in his laſt voyage, diſcovered the Sandwich and other iſlands in the Pacific Ocean, and explored the weſtern coaſt of America; ſo that he may be ſaid to have nearly completed the hydrography of the globe.

Notwithſtanding theſe diſcoveries at ſea, and our enlarged knowledge of the continents, there ſtill remain ſome countries of which we have very little knowledge, and others that are abſolutely unknown to us. In Aſia are many diſtricts, particularly in Tartary and Arabia, with which we are very little acquainted. In Africa our knowledge extends very little further than its coaſts and the banks of its rivers. In North America, the countries of New Britain, New North and South Wales, are very little known, and we are in the dark reſpecting that vaſt tract of land on the back of the United Provinces. And in South America, the countries of Guiana, Amazonia, Patagonia, &c. (the ſea-coaſts and a few towns excepted) are but imperfectly known. So that we may ſay there remains nearly one-third of the habitable ſurface of the earth to be examined.

But much information on this ſubject may be expected from the plan ſo lately adopted by ſeveral learned and opulent individuals in this kingdom for promoting the diſcovery of the interior parts of Africa; if ſuch ſpirited exertions were more common, and extended to the other quarters of the globe, our knowledge of them would be wonderfully increaſed, if not completed in a few years.

THE GRAND

DIVISIONS OF WATER.

THE Water whoſe continuity reaches round the globe, and encompaſſes the continents and iſlands, has the appearance of two immenſe bands, or belts, ſtretching from north to ſouth: the greater one is ſituated between Aſia and America, comprehending, from Pole to Pole, great part of the Northern and Southern, and the whole of the Pacific Ocean; and the leſſer one runs between Europe, Africa and America, containing, from pole to pole, the remaining parts of the northern and ſouthern, and the whole of the Atlantic Ocean.

Such parts of the general ocean as border on the land, and are in part ſurrounded by it, are called ſeas, gulphs, bays, &c. into which are ſuppoſed to flow more than 600 large rivers.

The water in the ocean is found to riſe and fall regularly twice in 24 hours, which motion is called the *tides*, or the *ebbing* and *flowing* of the ſea. It flows for near 6 hours, during which time it gradually ſwells, ſo that entering the mouths of harbours and rivers, it drives the water back towards their heads, and appears to reſt for a few minutes, which is called *high-water*: then it begins to ebb, and returns back for near 6 hours, and after reſting again for a ſhort ſpace of time, called *low-water*; it begins to flow as before.

This motion of the water is cauſed by the attractive powers of the ſun and moon; when theſe two luminaries act jointly, which is at the change and full of the moon, the tides are ſtronger and run higher than at other times, and are called *ſpring tides*; riſing in ſome bays, channels and wide-mouthed rivers from 12 to 50, or more feet, though in the open ſea they are ſeldom elevated above 3 or 4 feet.

But when the moon is in her quadratures, or 90 degrees from the ſun, their attractive powers are oppoſed, the tides become weaker and lower than at other times, and are called *neap tides*. The motion of the tides in ſome meaſure follows the courſe of the moon, and the time of high-water at any particular place happens about an hour after the moon has paſſed the meridian, which is every day later by about 50 minutes.

Beſides the tides, the water is found to have other motions, which are called *currents*, by which all bodies floating therein are compelled to alter their courſe, or velocity, or both; and are either general or particular. There is a conſtant motion of the water from eaſt to weſt, (ariſing from the diurnal rotation of the earth about its axis) which is ſaid to be ſtrong enough to carry a well-equipped ſhip round the globe, were ſhe to meet with no impediment from land, wind, &c. this is called a *general* or *perpetual current*.

There are others, which take different directions from the general one, and are limitted with reſpect to their lengths and breadths; they are cauſed by the waters being driven againſt promontories, or into gulphs and ſtreights, where, wanting room to ſpread, they are driven back, and thus diſturb the ordinary flux of the ſea; of theſe ſome are conſtant, others periodical, or ſhifting, like the monſoons, and ſometimes under currents are found, as thoſe in the *Downs* along the eaſtern coaſt of the county of Kent, in England, and in the ſtreights of Gibraltar, where as much water is carried out by the under current as is brought in by the upper one.

The water is alſo agitated, or put in motion by the great power of the *Wind*, which is a current, or ſtream of air, ſubject to the ſame irregularities as the water which it moves, and receives its name from the point of the compaſs, from whence it blows.

The Wind is found to be more violent in mountainous places than in plains, conſequently more regular at ſea, than at land, and ſeldom extends higher than three quarters of a mile, which is nearly the common height of the clouds: its velocity varies from 1 to 50 or 60 miles an hour, and in a common briſk gale about 15. If the wind blows gently, it is called a breeze; if harder, a gale; and if very hard, a ſtorm.

The Winds are either *general*, *periodical*, or *variable*. *General winds* are thoſe which blow conſtantly in one direction. *Periodical*, or *ſhifting trade winds*, called alſo *monſoons*, blow 6 months in one direction, then change, and blow 6 months in the oppoſite direction.—*Variable winds* are thoſe which are ſubject to no period, either in direction or return; and are found in moſt of the temperate climates, blowing, however, oftener from the weſt than any other point.

In our climate a violent wind is but rarely known; but between the tropics, and for a conſiderable ſpace beyond them, they vary their terrors; ſometimes involving all things in a ſuffocating heat; ſometimes mixing all the elements of fire, air, water and earth together; and ſometimes raiſing whole ſandy deſerts in one place to depoſit them in another.

The nature of the ſoil over which the wind blows has a great effect upon the quality of the air; the vaſt ſandy deſarts of Africa and Arabia give a burning heat and blaſting quality to the air that paſſes over them.—At Goree there is an eaſterly wind which ſcorches like a blaſt from a furnace.—An extraordinary blaſting wind is felt occaſionally at Falkland Iſlands, which cuts the herbage down as if fires had been made under it, the leaves are parched up and crumble into duſt.—But the moſt dreadful is the *Samiel*, or mortifying wind of the deſerts, near Bagdad. The camels, either by inſtinct or experience, are ſenſible of its approach, and are ſaid to make an unuſual noiſe, and cover up their noſes in the ſand. To eſcape its baneful effects, travellers throw themſelves as cloſe as poſſible to the ground, and wait till it has paſſed by, which is commonly in a few minutes.

From theſe unpleaſing accounts, and many others that might be enumerated, we have very little reaſon to envy the inhabitants of thoſe regions, for the luxuriance of their ſoil, or the brightneſs of their ſkies. Our own cloudy atmoſphere that wraps us round in obſcurity, though it fails to guild our proſpects with ſunſhine, or our groves with fruitage, neverthele&#383;s an&#383;wers the calls of indu&#383;try, and the labourer toils in the more certain expectation of a moderate, but happy return.

The General Ocean is divided into the five following particular ones, viz. the Northern, the Atlantic, the Pacific, the Indian, and the Southern Ocean; of each, an account here follows :—

THE NORTHERN OCEAN.

The Northern, or Frozen Ocean, extends from the northern &#383;hores of Europe, A&#383;ia and America, to the Poles; or may be &#383;aid to be comprehended within the Arctic Circle: con&#383;equently contains the greate&#383;t part of the North Frozen Zone.

This ocean is very difficult to navigate on account of the inten&#383;e cold, the variable and boi&#383;terous winds, and the amazing quantity of floating ice that has been increa&#383;ing for ages; &#383;ome of the pieces are more than a mile in length, and a hundred feet in thickne&#383;s, which, when put in motion by a &#383;torm, are terrible beyond de&#383;cription; the Dutch had thirteen &#383;hips cru&#383;hed to pieces by them in one &#383;ea&#383;on.

This ocean is chiefly navigated for the catching of whales on the coa&#383;t of Ea&#383;t and We&#383;t Greenland, the taking of which is chiefly monopolized by the Engli&#383;h and Dutch.

On the coa&#383;t of Norway, in latitude 67 degrees, is a dreadful vortex, or whirlpool, called the *Navel of the Sea*, and &#383;ometimes *Mo&#383;koe&#383;trom*, from the i&#383;land *Mo&#383;koe*, near which it is ſituated. At the time of flood the water runs up between this iſland and the coaſt of Norway with great rapidity; and at ebb returns back to the ſea with a noiſe equal to that of a thouſand cataracts, and is heard at the diſtance of many leagues, at which time it forms a vortex of great depth and extent, that proves deſtructive to all ſhips that are within a league of it, particularly when its natural fury is heightened by a ſtorm.

That part of the northern ocean ſituated between Lapland, and Samoieda in Ruſſia, is called the *White Sea*, near which ſtands the city of Archangel, and between Nova Zembla and Ruſſia are the Streights of *Waygats*. Into this ocean flow the rivers *Dwina*, *Oby*, *Lena*, *Jeniſea*, *Jana*, &c.

Captain Cook has explored this ocean as far as 70 degrees, and aſcertained the proximity of Aſia and America; and was of opinion, that a paſſage from the Atlantic into the Pacific Ocean, either by an eaſtern or weſtern courſe, was impracticable. But later navigators have pretended to detect ſome errors in Cook's northern voyage, and go a great way to make the diſcovery not yet hopeleſs; they are perſuaded that the inland ſea, in the latitude 48 degrees on the north-weſt part of America, lately diſcovered, divides that great continent, and communicates with Hudſon's Bay; if ſuch a paſſage does exiſt, it is more likely to be diſcovered by the progreſſive advances of mercantile enterpriſe, than by any immediate expedition undertaken for that purpoſe.

THE ATLANTIC OCEAN.

The Atlantic Ocean lies between the continents of Europe and Africa, on the eaſt, and America on the weſt; its greateſt width is about 4000 miles, and extends from the arctic circle to the limits of the general trade wind, or about 30 degrees ſouth of the equator; and is divided into two parts, viz. the *Weſtern* and *Ethiopic Oceans.*

In this ocean, for near 30 degrees on both ſides of the equator, the general trade winds are found to prevail; on the north ſide of it, they blow from the north-eaſt, on the ſouth ſide, from the ſouth-eaſt, and at the equator, due eaſt. On the coaſt of Guinea the wind always blows from the weſt and ſouth-weſt points of the compaſs.

Between the 4th and 10th degrees of north latitude, and the longitude of Cape Verd and the eaſternmoſt of the Cape Verd iſles, is a tract of ſea which ſeems to be condemned to perpetual calms, with reſpect to wind, but the thunder and lightning is terrible, and ſuch frequent rains, that it has acquired the name of the *Place of the Rains*: ſhips ſailing theſe 6 degrees have been ſometimes detained whole months, as it is reported.

Ships, in their paſſage from England to America and the Weſt Indies, generally endeavour to obtain an equal latitude with the place they are bound to, and then ſail directly weſt.

The *Baltic*, or *Eaſt Sea*, is a part of this ocean, encompaſſed by Sweden, Denmark, Ruſſia, Poland and Pruſſia. This ſea has no tides, nor is it ſo ſalt as the ocean, never mixing with it, becauſe a current always ſets out of it into the Atlantic. It is generally frozen up three or four months in the year.

The entrance to the Baltic is called the *Cattegate*, or *Scaggerac Sea*, which leads to the *Sound*, a ſtreight about four miles over, dividing Denmark from Sweden. At *Elſineur*, which is ſituated at the entrance of the Sound, the King of Denmark levies a tax on every ſhip that enters the Baltic. The other parts of this ſea are, the Gulph of Bothnia, which runs up into Sweden, and that of Finland, near which ſtands the city of Peterſburgh. Yellow amber is found in great plenty on this coaſt.

The *Mediterranean Sea*, between Europe, Aſia and Africa, communicates with the Atlantic Ocean, through the Streights of Gibraltar, which is about 8 leagues long, and 5 broad, through it ſets a current from the Atlantic, for the ſtemming of which a briſk gale is required. Its parts are, the *Adriatic Sea*, or Gulph of Venice; the *Ionian Sea*, near Greece; the *Levant*, on the coaſt of Egypt; the *Archipelago*, communicating with the ſea of *Marmora*, by a ſtreight called the *Helleſpont*; the *Black Sea* uniting with the ſea of Marmora, by the Streights of Conſtantinople; and the ſea of *Aſoph*, joining the Black Sea, by the Streights of *Kaffa*.

The Bays of *Baffin*, *Hudſon*, and *James*, in North America, communicate with the Atlantic through the Streights of *Davis* and *Hudſon*. The Gulph of *St. Laurence*, between Nova Scotia and Canada, has a communication with the Bay of *Fundy*, and is an outlet to the Lakes *Superior*, *Michigan*, *Huron Erie*, and *Ontario*; the ſmalleſt of which is 600 miles, and the largeſt not leſs than 1500 miles in circumference, they are all navigable, and joined to each other. Between Erie and Ontario is that ſtupendous cataract called the Falls of *Niagara*, half a mile in breadth; the water tumbles 160 feet perpendicularly, and may be heard at 15 miles diſtance.

The Gulph of Mexico, between North and South America, contains the Bay of *Campeachy*, the Gulphs of *Honduras* and *Darien*, and the *Spaniſh main*, ſouth of the iſthmus of Darien. The *Caribbean Sea* flows from the weſtern iſlands, in the Weſt Indies, to the north part of South America. The rivers which flow into the Atlantic Ocean have been already named in the account of Europe, Africa and America.

THE PACIFIC OCEAN.

The Pacific, or, as it is ſometimes called, the South Sea, and that part of it near Aſia, the Eaſtern Ocean; flows between the eaſtern ſhores of Aſia and the weſtern ſhores of America. Its greateſt width is about 10,000 miles, and extends from the arctic circle to the limits of the general trade wind, or about 30 degrees ſouth of the equator.

This ocean is named *Pacific* from the calmneſs and the conſtant trade wind which blows from the eaſt: ſhips have been known to ſail from Acapulco, in New Spain, to the Philippine iſlands, without changing or ſhifting their ſails, and it is ſaid that no ſhip has ever yet been loſt in that voyage. The ſame is remarked in ſailing from the Cape of Good-hope to Braſil, acroſs the Atlantic: which makes good that general obſervation, that thoſe parts of the ocean, the moſt diſtant from land, are the leaſt ſubject to ſtorms and tempeſts.

The parts of this ocean are, the ſea of *Kamſchatka* and gulph of *Anadir*, on the eaſtern ſhores of Siberia and Tartary. The ſea of *Korea*, or Japan, between the peninſula and the iſland of Japan. The *Yellow Sea*, eaſt of Pekin, in China. The gulph of *Tonquin*, ſouth of China. The gulph of *California*, between California and the continent of North America. The bay of *Panama*, ſouth of the iſthmus of Panama. The newly diſcovered *inland ſea*, on the weſtern coaſt of North America, into which Mr. Etche's ſhip, named the Princeſs Royal, penetrated ſeveral hundred leagues in a north-eaſt direction, till they came within 200 leagues of *Hudſon's Bay*. The rivers which fall into this ocean are but little known.

THE INDIAN OCEAN.

The Indian Ocean flows between the eaſtern ſhores of Africa, and the Eaſt India iſlands, New Holland, &c. being more than 3000 miles wide: and extends from the ſouthern ſhores of Aſia, to about 30 degrees on the ſouth ſide of the equator.

In this ocean, between Sumatra and the African coaſt, and from three degrees of ſouth latitude to the Aſiatic coaſt, which comprehends the Arabian ſea and the gulph of Bengal; the monſoons, or ſhifting trade winds, blow from September to April, north-eaſt; and from March to October, ſouth-weſt; but do not extend above 200 leagues from land: in the former ſix months the wind is more ſteady and gentle, and the weather clearer, than in the latter ſix months; it is alſo more ſteady and ſtronger in the Arabian ſea than in the gulph of Bengal.

In other parts of this ocean the periodical winds are alſo found to blow, particularly between Madagaſcar and Africa; where there is a conſtant freſh ſouth ſouth-weſt wind, from April to October: likewiſe between Sumatra and Java, on the weſt, and New Guinea, to the eaſt, the northern monſoons ſet in about October or November, and the ſouthern ones about May. Theſe winds are not quite ſo certain as thoſe in the Arabian ſeas.

The monſoons do not ſhift from one point of the compaſs to its oppoſite one all at once, but gradually; in ſome places the change is attended with calms, in others by variable winds; and it often happens on the ſhores of Coromandel and China, towards the end of the monſoons, that there are moſt violent ſtorms of wind, thunder and rain. All who navigate this ocean muſt be guided by theſe winds; for, ſhould they delay their voyage till the contrary monſoons begin, they muſt either ſail back, or go into harbour, and wait till a change takes place.

The parts of this ocean are, the *Red Sea*, between Africa and Arabia, the gulphs of *Perſia*, *Ormus*, *Scindi* and *Cambaya*, between Perſia and Arabia. The bay of *Bengal* and the gulph of *Siam*, on the coaſt of India. The ſtreights of *Malacca* and *Sunda*, between Malacca, Sumatra and Java. The rivers which flow into this ocean have been named in the deſcription of Aſia.

THE SOUTHERN OCEAN.

The Southern Ocean contains the greateſt part of the globe's ſurface between the thirtieth degree of ſouth latitude, and the ſouth pole.

This ocean is very much agitated by violent ſtorms, and dreadful tempeſts; and like the northern one, contains immenſe iſlands and mountains of floating ice, that threaten deſtruction to all ſhips that approach them.

A much greater degree of cold is felt in advancing towards the ſouth pole, than the north; which ariſes from a greater quantity of water in the ſouthern hemiſphere than in the northern: and it is well known that the ſurface of water cools the atmoſphere infinitely more than the ſurface of land.

The much lamented Captain Cook has traverſed this ocean between the latitude of 40 and 70 degrees, in ſuch a manner, as not to leave a poſſibility of the exiſtence of a ſouthern continent, unleſs near the pole, and out of the reach of navigation.

It is the opinion of Monſ. de Pauw, that there exiſts a periodical motion in nature as yet unknown, which occaſions an alternate flux of water from pole to pole; and that the ſea is gradually retreating from the north towards the ſouth: according to the Swediſh naturaliſts it has lowered more than four feet and a half in a century. And M. de la Borde, in his hiſtory of the South Sea, attempts to prove that this ocean occupies the place of what was once a continent.

It is very remarkable, that the three great capes or promontories of the earth, viz. Cape Horn, the Cape of Good-hope, and that of Diemeno-land, in New Holland, are turned towards the ſouth; alſo the three great promontories, Calabria, the Morea, and the Crimea, in the Mediterranean Sea; likewiſe Cape Cormorin and Malacca, in

Aſia, St. Lucar, in California, Cape Farewell, in Greenland, &c. are nearly in the ſame direction; which makes it probable, that immenſe volumes of water have rolled with great violence from the ſouth to the north, by different directions, and that they have made breaches wherever the ſoft and ſandy ſoils have given way to the impulſe of the ocean.

The greateſt breach the waters have made in the eaſtern continent appears between Africa and New Holland to Cape Cormorin; which being formed of vaſt impenetrable rocks, it apparently divided the currents from the ſouth. One of theſe being beaten out of its firſt courſe ſeems to have forced its way into the land at Babelmandel, and to have abſorbed all the ſpace occupied at this day by the Red Sea.

The Perſian Gulph ſeems to have been produced by the ſame irruption and tendency of the ocean to the north, and the Caſpian Sea was, with great reaſon, ſuppoſed by the ancients to be a prolongation of the Perſian Gulph; for in tracing the ſpace between them, there are indubitable veſtiges of the ſea's ancient bed, viz. a wide champaign country of moving ſands, mixed with fragments of ſhells and remains of marine ſubſtances. In going beyond theſe dry plains an entrance is made into the great deſert of ſand: in the depth of this ſolitude, enormous mountains of ſalt are frequently ſpread upon the ſurface for many leagues: on the right of this region of ſalt runs a line of ſandy hills which the winds have heaped together; and in advancing further north, the earth inclines and continues ſloping perceptibly to Firabad, near the Caſpian Sea.

Perhaps many of the portions of land, called iſlands, &c. that are ſituated near the continents, were ſevered from them by this violent motion of the water towards the north; ſuch as Ceylon, from the Peninſula of India; Madagaſcar, from Africa; Great Britain, from Europe; Ireland, from Great Britain; Newfoundland, from North America; the Peninſula of California, from New Mexico; and the Continent of North America, from Aſia.

But whether this alternate flowing of the water from pole to pole exiſts or not, it is certain that the globe has ſuffered great viciſſitudes ſince the deluge; earthquakes have ſwallowed ſome lands, and ſubterraneous fires have thrown up others; the ſea retreating from the ſhores has lengthened the land in ſome places, and advancing, has diminiſhed it in others; it has alſo ſeparated ſome territories which were before united, and formed new ſtreights, bays and gulphs; ſo that the preſent inhabitants of the globe may be ſaid to plough thoſe lands over which ſhips formerly ſailed, and to ſail over lands which were formerly cultivated.

ASTRONOMY.

DEFINITIONS & PRINCIPLES.

ASTRONOMY is a ſcience that deſcribes the magnitudes, motions, diſtances and appearances of the heavenly bodies.

The Univerſe is conſidered by Aſtronomers as compoſed of an infinite number of ſyſtems or worlds, placed in every direction: that each ſyſtem has a number of bodies, called planets, revolving round a ſun, that is fixed in, or near the center of each: and that theſe ſuns and planets are the ſtars ſeen in the heavens.

The heavenly bodies are of two kinds, viz. *fixed* and *wandering*. The fixed bodies are ſuns, in the centers of their reſpective ſyſtems, ſhining by their own light; they appear of various ſizes according to their various diſtances, and are obſerved to keep the ſame ſituation in reſpect to one another. The wandering bodies are the planets, which revolve round the ſun; they are all ſuppoſed to be ſurrounded with an atmoſphere, and to receive their light from the ſun, being of themſelves opaque bodies.

The Planets are either *primary*, *ſecondary* or *cometary*. *Primary planets* are thoſe, which, in revolving round the ſun, reſpect him only as the center of their courſes, the motions of which are regularly performed in tracks or paths, that are found by obſervation to be elliptical and concentric to each other.

Secondary Planets, commonly called *ſatellites*, or *moons*, are thoſe which revolve round a primary planet as their center, and are at the ſame time carried round the ſun with it.

Cometary Planets, or *Comets*, vulgarly called *blazing ſtars*, are ſolid bodies, with long tranſparent trains reſembling flame iſſuing from that ſide which is from the ſun; they revolve round him probably as regularly as the reſt of the planets, but in much longer tracks and periods of time.

Aſtronomers, in order to obſerve the motions of the heavenly bodies, have imagined certain lines, circles, and ſpaces, to be deſcribed in the heavens, to which they have given the names of celeſtial axis, poles, equator, ecliptic, meridians, colures, &c. which are ſimilar and concentric to thoſe drawn on the earth, therefore need no deſcription; there are alſo many other terms uſed in this ſcience of which the moſt common are as follows:—

The *Zodiac* is a ſpace about 16 degrees broad ſurrounding the heavens; in which the orbits, or paths of the planets are included, each having a track peculiar to itſelf:

that deſcribed by the earth is the ecliptic, with which the orbits of the other planets are compared.

All the planets have two motions, viz. one round the ſun, called *annual*, and the other round their own axis, called *diurnal*: they move round the ſun from weſt by ſouth to eaſt, croſſing the ecliptic twice in each revolution; ſo that one half of their orbits are on the north ſide of the equator, and the other half on the ſouth ſide. And move round their axis from weſt to eaſt.

The planets move faſter as they approach the ſun, and ſlower as they recede from him. Hence it is, that the ſun's apparent motion is no ways equal, being different from the true and equable time ſhewn by a well regulated clock, whereby all the celeſtial motions are to be eſtimated and accounted.

The time ſhewn by a ſun-dial and a well-regulated clock, agree only four times in the year; on the 15th of April, the 16th of June, the 31ſt of Auguſt, and the 24th of December. If the clock goes true all the year round, it will be before the ſun from the 24th of December to the 15th of April; from that time to the 16th of June, the ſun will be before the clock; from thence to the 31ſt of Auguſt, the clock will again be before the ſun; and from the 31ſt of Auguſt to the 24th of December, the ſun will be faſter than the clock.

The Planets in their revolutions round the ſun are ſometimes nearer to and ſometimes further from him: their fartheſt diſtance is called *aphelion*, or *ſuperior Apſis*; their neareſt diſtance *perihelion*, or *inferior Apſis*: and the line joining thoſe diſtances is called the line of the *Apſides*.

The *mean diſtance* of a planet from the ſun, is when it is at either extremity of the conjugate diameter of its elliptical orbit.

The *mean motion* of a planet is that which would take place if it moved in a perfect circle, and equally every day.

Apogeon is the greateſt, and *perigeon* the leaſt, diſtance of any planet in its orbit from the earth.

The *nodes* are the two points where the orbit of a planet interſects the plane of the ecliptic: the right line joining theſe points, is called the line of the nodes. When a planet croſſes the ecliptic into the northern hemiſphere, it is called the *aſcending node*, and marked thus ☊. But when it paſſes into the ſouthern hemiſphere, it is called the *deſcending node*, and marked thus ☋.

When two ſtars or planets are ſeen in the ſame point of the heavens, or anſwer to the ſame degree in the ecliptic, they are ſaid to be in *conjunction*. But when they are 180 degrees aſunder, or in oppoſite parts of the heavens, they are ſaid to be in *oppoſition*.

When the motion of the heavenly bodies is from weſt to eaſt, or according to the order of the ſigns, it is called *direct*, or in conſequentiâ; when they appear to ſtand ſtill, they are ſaid to be *ſtationary*; and when their motion is from eaſt to weſt, it is called *retrograde*, or in antecedentiâ.

The *declination* of the ſun, moon or ſtars, is their diſtance north or ſouth from the celeſtial equator, reckoned in degrees and minutes upon a meridian; and is ſimilar to latitude on the earth.

The *latitude* of a ſtar or planet, is its diſtance from the ecliptic, reckoned in degrees, minutes, &c. upon the arc of a great circle which is perpendicular to it, either north or ſouth.

The *longitude* of a ſtar or planet, is its diſtance from the firſt point of *Aries*, reckoned in degrees, minutes, &c. upon the ecliptic.

All circles drawn through the zenith and nadir, cutting the horizon at right angles, are called *vertical circles*: that which cuts the horizon in the north and ſouth points, is called the *meridian*, or 12 *o'clock hour circle*: and that which cuts it in the eaſt and weſt points, is called the *prime vertical*, or 6 *o'clock hour circle*.

The names of the 32 parts or points into which the horizon is divided, are theſe which follow.—North. N. by E. NNE. NE by N. NE. NE by E. ENE. E by N. —Eaſt. E by S. ESE. SE by E. SE. SE by S. SSE. S by E.—South. S by W. SSW. SW by S. SW. SW by W. WSW. W by S.—Weſt. W by N. WNW. NW by W. NW. NW by N. NNW. and N by W.

It is uſual to ſay the ſun, moon or planets riſe on ſuch a point, or ſo many degrees from the eaſt or weſt, north or ſouth: if their diſtance is reckoned from the eaſt or weſt point of the horizon it is called their *amplitude*; if from the meridian their *azimuth*.

If a heavenly body riſes or ſets when the ſun riſes, it is ſaid to riſe or ſet *coſmically*; if it riſes or ſets when the ſun ſets, it is ſaid to riſe or ſet *achronically*; if it emerges from the ſun's rays and appears before him in the morning, or is hid in his beams, ſo as not to be ſeen after him in the evening, it is ſaid to riſe or ſet *heliacally*.

The *altitude* of any object, is his height above the horizon, reckoned upon a vertical circle in degrees and minutes.

The *zenith* diſtance of any object is an arc of a vertical circle contained between the center of that object and the zenith.

The *oblique aſcenſion* of any object, is an arc of the equinoctial, between the firſt point of Aries, and the eaſtern part of the horizon, when that object is riſing. And the *oblique deſcenſion* is the arc between the ſame point and the weſtern part of the horizon, at its ſetting.

The *right aſcenſion* of any object is an arc of the equator between the firſt point of Aries, and a meridian paſſing through that point; and is ſimilar to longitude on the earth. The difference between the right and oblique aſcenſion is called the aſcenſional difference.

Elongation, is the angular diſtance of a planet from the ſun, as it appears to a ſpectator upon the earth.

The place that any planet appears to occupy in the celeſtial hemiſphere, when ſeen by an obſerver, ſuppoſed to be placed in the ſun, is called its *heliocentric* place; but when ſeen from the earth its *geocentric* place.

Aberration, is an apparent change of place in the fixed ſtars, which ariſes from the motion of the earth combined with the motion of light.

Parallax, is the difference between the places of any celeſtial object, as ſeen from the ſurface of the earth, and from its center.

The *Tropical*, or *Solar Year*, is the time the earth takes to revolve from either tropic or ſolſtice to the ſame again, and contains 365 days, 5 hours, 48 minutes, and 57 ſeconds, which is the natural year, becauſe it always keeps the ſame ſeaſons to the ſame months.

The *Siderial Year*, is the time the earth revolves from any fixed ſtar to the ſame again, and contains 365 days, 6 hours, 9 minutes, and 14½ ſeconds, which is longer than the true ſolar year.

The *Julian* or *Civil Year*, contains 365 days for three years running, which are called common years; then comes in what is called the *Biſſextile*, or *Leap-year*, which contains 366 days: In our almanacks, this day is added to the end of February.

A *Periodical*, or *Lunar-month*, is the time the moon takes up in revolving from one point of her orbit to the ſame point again, and conſiſts of 27 days, 7 hours and 43 minutes.

A *Synodical Month*, is the time the moon ſpends in paſſing from one conjunction with the ſun to another, which is 29 days, 12 hours and 44 minutes.

The motions of the hour and minute hands of a watch will give ſome idea of the periodical and ſynodical revolutions of the moon; for when the minute hand has performed a complete revolution, it has yet ſome diſtance to go to have the ſame meeting with the hour hand which it had an hour before.

When the moon is in conjunction or oppoſition to the ſun, ſhe is ſaid to be in her *ſyzigies*, and when at 90 degrees diſtance from the ſun, to be in her *quadratures.*

Preceſſion of the Equinoxes is a ſlow motion of the two points where the equator interſects the ecliptic, which are found to go backwards about 50 ſeconds a year; by which means the whole ſtarry firmament appears to have a ſlow motion from weſt to eaſt, about the poles of the ecliptic.

By *Refraction* is meant, the bending of the rays of light as they paſs out of one medium into another. The rays of light from the ſun, moon and ſtars in paſſing through the atmoſphere are ſo refracted, that theſe bodies appear to a ſpectator on the earth more elevated above the horizon than they really are, and may be ſeen when they are below it.

In climates near the equator, where the air is pure, the refraction is leſs, but in climates nearer the poles it encreaſes exceedingly, and is a happy proviſion for lengthening the appearance of light at thoſe regions ſo remote from the ſun. In our climate we are favoured with the ſight of the ſun about 3¼ minutes before it riſes, and as much every evening after it ſets; and in 75 degrees of north latitude the ſun is ſeen 17 days before he comes above the horizon.

Twilight is that ſmall illumination of the atmoſphere between day and night, and ariſes from the property of refraction. The ſun's rays in falling upon the higher part of the atmoſphere, are reflected back to our eyes, and form a faint light, which gradually augments till it becomes day: It begins in the morning when the ſun approaches within

18 degrees of the horizon, and ends when he deſcends 18 degrees below it.

The greater the latitude the longer the twilight continues: in a right ſphere, twilight is quickly over; in an oblique ſphere it laſts longer; and in a parallel ſphere it continues for ſeveral months.

Note.—Degrees are frequently marked with an °, and minutes with a daſh ′. Thus 30 degrees, 16 minutes, are marked 30°. 16′.

THE SOLAR SYSTEM.

The Solar Syſtem is contained within that part of the univerſal ſpace called, the viſible world, and conſiſts of the Sun, 7 primary planets, 14 ſatellites or moons, and an uncertain number of comets. All which (the Sun excepted) are ſolid opaque globular bodies, of different magnitudes, and receive their light and heat from the ſun, which, they reflect upon each other in the ſame manner as a poliſhed body does that of a candle, by which means they become viſible to us.

The names and characters of the 7 planets, in their order from the ſun, are *Mercury* ☿, *Venus* ♀, the *Earth* ⊕, with its Moon ☽, *Mars* ♂, *Jupiter* ♃, with his 4 moons, *Saturn* ♄, with his 7 moons, and the *Georgium Sidus* ♅, a new diſcovered planet, with its 2 moons. Mercury and Venus move within the orbit of the earth, and are called *Inferior Planets*, the others move on the outſide of its orbit, and are called *Superior Planets.*

THE SUN.

The Sun is an immenſe globe, 890,000 miles in diameter, a million times greater than the earth, and 500 times larger than all the planets together. It is placed nearly in the center of all the planets orbits, and is the fountain of light, the ſource of the ſeaſons, the cauſe of the viciſſitudes of day and night, the parent of vegetation, and the friend of man. The only motion the ſun has is round its axis in about 25¼ days, which, as well as its globular form, is diſcovered

covered by the motion of the ſpots obſervable on its ſurface. It is ſuppoſed to be ſurrounded with an atmoſphere, which occaſions that appearance called, the *zodiacal light*, of a whitiſh colour reſembling the milky way.

MERCURY ☿.

MERCURY is the neareſt planet to the ſun, he moves round it in about 3 months, at the mean diſtance of 37 millions of miles, and at the rate of 110,000 miles per hour, in his orbit. He is the ſmalleſt of all the planets, being only 3260 miles in diameter; no ſpots have yet been diſcovered on his ſurface to determine the time of his diurnal motion, on account of his being loſt in the ſplendor of the ſun.

He never appears more than 6° 54′ either on the north or ſouth ſide of the ecliptic: is ſeldom to be ſeen with the naked eye, though he receives 7 times as much light and heat from the ſun as the earth does: but with glaſſes he appears extremely bright and brilliant, and has all the phaſes, or appearances, which are common to the moon.

When Mercury is very near his node, and between the earth and ſun (call'd *inferior conjunction*) he appears like a black ſpot paſſing over the ſun's diſk, or face: but when he is near his node, and the ſun is between him and the earth (called *ſuperior conjunction*) he is then entirely eclipſed behind the body of the ſun. This planet is never to be ſeen more than 2 hours either before the ſun riſes, or after it ſets. The ancients called him the *Meſſenger of the Gods*, on account of his rapid movements.

VENUS ♀.

Venus is the next planet in order from Mercury, ſhe moves round the ſun in 7½ months at the mean diſtance of 69 millions of miles, and at the rate of 80,000 miles per hour in her orbit. She is ſomething leſs than the earth, being only 7600 miles in diameter, and from the motion of the ſpots on her ſurface, is found to revolve on her axis in 23⅓ hours.

She never appears more than 3° 20′ on either ſide of the ecliptic, but receives nearly twice the light and heat from the ſun that the earth does, and from her being the moſt beautiful ſtar in the heavens, the poets have called her the *Goddeſs of Beauty*. When viewed through a teleſcope ſhe appears to have all the phaſes common to the moon.

When Venus is in her inferior conjunction, ſhe appears like a black ſpot paſſing over the ſun's diſk, and when in her ſuperior conjunction, is entirely eclipſed by the ſun. This planet can never be ſeen more than 3¼ hours, either before the ſun riſes or after it ſets. When ſhe appears to the weſtward of the ſun ſhe is called *Phoſphorus*, or *Lucifer*, or the *Morning Star*; and when to the eaſtward, *Heſperus*, or *Veſper*, or the *Evening Star*.

THE EARTH ⊕.

The Earth is the next planet in order from Venus, it moves round the ſun in about 365¼ days, at the mean diſtance of 96 millions of miles, and at the rate of 68,000 miles per hour in its orbit. It is found to revolve on its axis from weſt to eaſt, in about 24 hours.

The Earth is encompaſſed with a thin tranſparent inviſible fluid, called the *Atmoſphere*, which partakes of its annual and diurnal motions. It is capable of being expanded by heat, condenſed by cold, and compreſſed by force. It gravitates towards the earth, ſo that it becomes gradually thinner and lighter, the further it is from its ſurface; at the height of 50 miles (which is conſidered as the extent of the atmoſphere) it is ſo very thin and light as to be blended with, or loſt in the ether, which is ſuppoſed to fill the univerſe.

From the annual motion of the earth round the ſun in the ecliptic, the phenomena of the ſeaſons, thoſe grateful viciſſitudes on which ſo much both of the buſineſs and happineſs of man depends, are produced, viz.

Spring, which begins on the 20th of March, the ſun is then over the equator, the earth is illuminated from pole to pole, and the days and nights are equally long at all places.

Summer, begins on the 21ſt of June, the ſun is then over the tropic of cancer, the north frozen zone is illuminated, we have long days and ſhort nights, and the ſouth frozen zone is involved in darkneſs.

Autumn, begins on the 22d of September, the ſun is returned to the equator, and makes equal days and nights at all places.

Winter, begins on the 21ſt of December, the ſun is then over the tropic of capricorn, the ſouth frozen zone is illuminated, we have ſhort days and long nights, and the north frozen zone is involved in darkneſs.

The ſun is nearly eight days longer in paſſing through the northern ſigns than the ſouthern ones; ſo that our ſummer half year exceeds the winter half year by that difference.

The turning of the earth on its axis from weſt to eaſt cauſes an apparent diurnal motion of the ſun and ſtars from eaſt to weſt. That part of the earth which is turned towards the ſun, has day, and the other part night. It is attended by one ſatellite, or ſecondary planet, called the moon.

THE MOON ☽.

The Moon is a conſtant attendant on the earth, revolving round it at the mean diſtance of 240,000 miles in about 29 days from change to change, and turns on her axis once during that time; ſo that we conſtantly ſee the ſame face turned towards us. Her day and night, taken together, is as long as our lunar month. She is 2160 miles in diameter, and moves 2300 miles per hour in her orbit.

The Moon, at her conjunction, is inviſible; at her oppoſition, her whole diſk is enlightened; at her quadratures, ſhe is half enlightened; between her conjunction and quadrature, ſhe is horned; and between her quadrature and oppoſition, ſhe is gibbous. In September, when the moon is at the full, ſhe riſes nearly at the ſame time for ſeveral days, which occaſions her to be then called the *Harveſt Moon*.

Next to the Sun the Moon is the moſt ſplendid and ſhining globe in the heavens. By diſſipating, in ſome meaſure, the darkneſs and horrors of the night; ſubdividing the year into months; and regulating the flux and reflux of the ſea;

ſea: ſhe not only becomes a pleaſing, but a welcome object; an object affording much for ſpeculation to the contemplative mind, and of real uſe to the navigator, the traveller, and the huſbandman.

When the moon is viewed through a teleſcope her ſurface appears rough and replete with mountains and vallies; and her light cool and ſilvery. She appears much larger to the inhabitants of the earth than any of the other planets, on account of her being much nearer to them. The earth may be conſidered as a moon, or ſatellite to the moon, waxing and waning in a regular manner: it is 13 times larger, conſequently affords her much more light than ſhe does the earth.

An *Eclipſe* is the privation of light in any of the heavenly bodies, of which, the moſt common to us are thoſe of the ſun and moon. Eclipſes were, in former ages, beheld with terror and amazement, and looked upon as portending calamity and miſery to mankind; but ſince the advancement of ſcience we are delivered from theſe fears and idle apprehenſions.

The ſun is eclipſed when the moon paſſes in a direct line between the earth and that luminary, which can never happen but at the time of a new moon; the eclipſe begins on the ſun's weſtern ſide, and goes off on his eaſtern.

The moon is eclipſed when ſhe is oppoſite to the ſun, or has the earth in a ſtraight line between her and the ſun, which can never happen but at the time of a full moon; this eclipſe begins on the moon's eaſtern ſide, and goes off on her weſtern.

A twelfth part of the ſun or moon's diameter is called a *Digit*; and in eclipſes it is generally ſaid how many digits are eclipſed at certain times, according to the number of parts which are involved in darkneſs. When the whole face of the ſun or moon is covered, it is called a *total* eclipſe; and when only a part, a *partial* eclipſe. *Penumbra* is that partial or faint ſhadow which accompanies an eclipſe.

The greateſt number of eclipſes of both luminaries which can happen in a year, is 7, and the leaſt 2; but the moſt uſual number is 4, and it is very ſeldom that more than 6 happen, of which one-half are generally inviſible at any place. Eclipſes of the ſun are more frequent than thoſe of the moon, but not ſo many of them are viſible. The longeſt duration of a total and central eclipſe of the moon from beginning to end is not more than 4 hours, and the ſhorteſt not leſs than 3 $\frac{1}{2}$ hours. And from the motion of the moon in her orbit, a total eclipſe of the ſun can never exceed 4 minutes.

MARS ♂.

MARS is the next planet in order from the earth; he moves round the ſun in near 2 years, at the mean diſtance of 146 millions of miles, and at the rate of 55,000 miles per hour in his orbit. To this planet the earth and moon appear like 2 moons, ſometimes half or three quarters illuminated, but never full.

He is about $\frac{1}{5}$ part as large as the earth, and receives but half the light and heat that the earth does. From the motion of the ſpots on his ſurface he is found to revolve on his axis in about 24 $\frac{2}{3}$ hours; the diameter of this planet is 5300 miles, his red and fiery appearance is ſuppoſed to ariſe from a groſs thick atmoſphere, with which he is ſurrounded; and from his ſanguinary appearance, is called the *God of War*.

He never appears more than 1° 52′ on either ſide of the ecliptic, and has a ſuperior conjunction and oppoſition; in both ſituations he ſhines with a full face. When Mars is in oppoſition he is often miſtaken for a comet, but when in conjunction, he appears ſmall and is ſcarcely to be diſtinguiſhed from a fixed ſtar; being in the former ſtate 5 times larger than in the latter, hence we conclude that he is 5 times nearer the earth in one ſituation than in the other. Dr. Herſchel has obſerved two white luminous circles ſurrounding the poles of this planet; theſe are ſuppoſed to ariſe from the ſnow lying about thoſe parts.

JUPITER ♃.

JUPITER is the next planet in order from Mars, he moves round the ſun in near 12 years, at the mean diſtance of 500 millions of miles, and at the rate of 30,000 miles per hour in his orbit. He is the largeſt of all the planets, but receives only $\frac{1}{27}$ part of the light and heat that the earth does. He is about 90,000 miles in diameter and from the motion of the ſpots on his ſurface, is found to revolve on his axis in about 10 hours.

This planet never appears more than 1° 20′ on either ſide of the ecliptic, and has a ſuperior conjunction and oppoſition; in both ſituations he ſhines with a full face. He is attended by four moons, which are conſtantly revolving round him, and to the naked eye he appears almoſt as large as Venus, but not altogether ſo bright, having a bluiſh caſt. The ancient poets called him the *God of Thunder*.

The ſwiftneſs of his diurnal motion is ſuppoſed to draw his atmoſphere into lines, or ſtreaks, and form thoſe appearances on his face we call *belts*. All Jupiter's moons in their revolutions paſs through his ſhadow, and the three neareſt are eclipſed in every revolution. By theſe, Aſtronomers have diſcovered, that the ſun's light takes up about 8 minutes in reaching the earth, and by them the longitude of places on the earth is determined with greater certainty and facility than by any other method yet known.

SATURN ♄.

Saturn is the next planet in order from Jupiter; he moves round the ſun in about 30 years, at the mean diſtance of 916 millions of miles, and at the rate of 22,000 miles per hour in his orbit. His diameter is 80,000 miles, and Dr. Herſchel has lately diſcovered, that he revolves round his axis in about $10\frac{1}{4}$ hours.

This planet never appears more than 2° 30′ on either ſide of the ecliptic, and has a ſuperior conjunction and oppoſition; in both ſituations he ſhines with a full face.

He receives but $\frac{1}{90}$ part of the light and heat from the ſun that the earth does, but to compenſate for this loſs, he is ſurrounded with a large magnificent luminous *ring*, that is 20,000 miles in breadth, the edge of the ring is next the body of the planet, and at all parts at a diſtance equal to the breadth. This ring is found to be double.

Saturn is attended by 7 moons that are continually moving round him on the outſide of his ring. He was called by the ancients the *God of Time*. On account of his great diſtance he appears to us with a very feeble light, and leſs ruddy than Mars.

THE

THE GEORGIUM SIDUS ♅.

The **Georgium Sidus** was diſcovered by the ingenious Mr. (now Dr.) Herſchel, a German, in the night of March 13th, 1781, it has already received various names, as the *Georgian Planet*, the *New Planet*, and the *Planet Herſchel*, by which name it is called by the Aſtronomers of all foreign nations, and by them denoted by this character ♅.

It is about 80 times as large as the earth, and moves round the ſun in about 83 years. Its diameter is 34,000 miles and its diſtance from the ſun nearly twice that of Saturn's: the time that it turns on its axis is not yet known, but it is found to be attended by two moons, and its light is of a bluiſh white colour, in brilliancy between that of the Moon and Venus. In a very clear night, when the moon is abſent, it is ſaid to be ſeen with the naked eye.

In order to make the mean diſtances of the planets clearer to the mind, they may be expreſſed by the following numbers, viz. If Mercury be ſuppoſed 28 yards from the ſun, Venus will be 52, the Earth 79, Mars 109, Jupiter 273, Saturn 684, and the Georgium Sidus 1358 yards.

Alſo the magnitudes of the planets, when compared with the ſun, may be better comprehended, by ſuppoſing the ſun to be 2 feet in diameter, Mercury will then be $\frac{1}{13}$ of an inch in diameter, Venus $\frac{1}{7}$, the Earth $\frac{1}{5}$, Mars $\frac{1}{12}$, Jupiter $2\frac{1}{4}$ inches, Saturn $2\frac{1}{10}$, and the Georgium Sidus about 1 inch.

From this ſhort deſcription of the appearances of the planets, it will be no very difficult taſk to diſtinguiſh them in the heavens; for if, after ſunſet, a planet be obſerved nearer the eaſt than the weſt, it cannot be either Mercury or Venus, and the light and colour of it will determine whether it be Mars, Jupiter, Saturn, or the Georgium Sidus.

COMETS.

The Comets move round the ſun in orbits that are exceedingly excentric, and croſs the paths of the planets in all manner of directions, ſo that they are not confined within the zodiac, but are variouſly inclined to the ecliptic. In one part of their journey through the heavens they approach ſo near the ſun, as to be exceedingly heated, then recede from him, and haſten back to the fixed ſtars, entering ſo far into the regions of infinite ſpace, as to be almoſt totally deprived of light and heat.

Few of them can be ſeen till they approach the ſun, when they begin to put forth their tails, which at firſt are ſhort and thin, but afterwards grow longer and thicker; and when they are near, and in conjunction with him, they ſend forth fiery beams of light every way; after they are paſt the ſun they put forth a tail 40 or 50 degrees long, which diminiſhes in length and ſplendor as the comet recedes; many of them without their train or ſtream of rarified matter, appear no larger than ſtars of the firſt magnitude.

The number of Comets belonging to the Solar Syſtem is unknown, but it is ſuppoſed to be very great, as the orbits of 80 have already been calculated. That which appeared in 1532 and 1661, and was expected in 1789, or 1790, was not diſcovered; whether it paſſed unobſerved, or whether the two Comets ſeen by Appian and Hevelius were not really the ſame, or whether the attractions of the known and perhaps the unknown planets may have influenced the Comet to ſuch a degree as to change its path and time of appearance, is very uncertain: it is, however, evident, that cometology is at preſent in a very imperfect ſtate.

Comets were imagined in ancient times to be prodigies hung out by the immediate hand of God in the heavens, and intended to alarm the world. Their nature being now better underſtood, they are no longer terrible to the generality of people.

But to ſuch as ſtill conſider them as the harbingers of divine vengeance, or the certain forerunners of ſome dreadful event; it will not be amiſs to obſerve, that the great Architect of the Univerſe has framed every part according to divine order, and ſubjected all things to laws and regulations; that he does not hurl at random ſtars and worlds, and diſorder the whole ſyſtem, to produce falſe apprehenſions of diſtant events or fears without foundation, and without uſe.

THE FIXED STARS.

No part of the Univerſe gives ſuch enlarged ideas of the ſtructure and magnificence of the Heavens as the conſideration of the number, magnitude and diſtance of the Fixed Stars. Among the many diſtinctions that characterize them from the other luminaries of Heaven, that which is afforded by their light or peculiar luſtre, is the moſt obvious. The light of the planets is ſteady, becauſe it is reflected; that of the ſtars is bright and lively, and accompanied with an appearance which we call twinkling.

They form no part of the Solar Syſtem, nor is it to be imagined that they are placed in one concave ſurface ſo as to be all equally diſtant from us, but that they are diſperſed through unlimited ſpace, in ſuch a manner, that there may be as great a diſtance between any two neighbouring ſtars, as there is between our ſun and that which is the neareſt to him.

The difference in the apparent magnitude of the ſtars is ſuch as to admit of their being diſtinguiſhed into ſix different claſſes; the largeſt being called ſtars of the firſt magnitude; thoſe that appear ſomething leſs, of the ſecond magnitude, and ſo on to the ſixth, which include all the ſtars that are viſible to the naked eye; thoſe which cannot be ſeen without glaſſes are called *teleſcopic ſtars.*

The number of ſtars of the firſt magnitude are about 20, of the ſecond 65, of the third 205, of the fourth 485, of the fifth 648, and of the ſixth 1420, in all near 3000: of which not more than 1000 can be ſeen with the naked eye at one time in either hemiſphere; their ſeeming innumerable at firſt ſight, ariſes from our viewing them confuſedly, and without reducing them to any order. If they are viewed diſtinctly, and only a ſmall portion of the heavens conſidered at a time, and after ſome attention to the ſituation of the remarkable ſtars contained in that portion, we begin to count, we ſhall be ſurprized at the ſmallneſs of their number, and the caſe with which they may be enumerated.

The Heavens are divided by Aſtronomers into three Regions, called the *Northern* and *Southern Hemiſpheres* and the *Zodiac*. And in order that the ſtars may be diſtinguiſhed and pointed out according to their true poſitions and ſituations, they have been claſſed under the outlines of certain imaginary figures of birds, beaſts and other animals, which are called *Conſtellations*, each containing ſuch ſtars as are ſituated near each other.

The number of conſtellations in the northern hemiſphere is 36, in the ſouthern 32, and in the zodiac 12. The diviſion of the zodiac into 12 ſigns has a relation to the 12 months in the year, and the animals by which they are repreſented, are emblems of the different productions of nature in thoſe ſeaſons over which they preſide. Many of the other conſtellations appear to have been formed in honour of certain heroes, and celebrated perſonages, whoſe memory they were meant to perpetuate.

The following table contains the names, &c. of the conſtellations, the number of ſtars obſerved in each; and the day of the month the ſun enters each ſign of the zodiac.

NORTHERN CONSTELLATIONS.

NAMES.	STARS.
Urſa Minor, the little Bear	12
Urſa Major, the great Bear	105
Draco, the Dragon	49
Cepheus	40
Aſterion and Chara, the Greyhounds	24
Bootes, Arctophilax	53

NAMES.	STARS.
Mons Mænalus	11
Coma Berenices, Berenice's Hair	24
Cor. Caroli, Charles's Heart	3
Corona Borealis, the Northern Crown	11
Hercules, Engonaſin	92
Cerberus	9
Lyra, the Harp	24
Cygnus, Gallina, the Swan	73
Vulpecula, the Fox	29
Anſer, the Gooſe	10
Lacerta, the Lizard	12
Caſſiopeia	52
Camelopardalus, the Camelopard	23
Serpens	50
Serpentarius, Ophiuchus	67
Scutum Sobieſki, or Sobieſki's Shield	8
Aquila Vultur, the Eagle	29
Antinous	34
Delphinus, the Dolphin	18
Equulus, *Equi-ſectio*, the Horſes Head	12
Sagitta, the Arrow	13
Andromeda	66
Perſeus	67
Pegaſus Equus, the flying Horſe	81
Auriga, the Waggoner	46
Lynx	55
Leo Minor, the little Lion	20
Triangulum Minor, the little Triangle	5
Triangulum Major, the great Triangle	10
Muſca, the Fly	6

SIGNS

SIGNS in the ZODIAC.

		Names.	*Months.*	*Marks.*	*Stars.*
Northern Signs.	*Spring.*	*Aries*, the Ram	March 20	♈	46
		Taurus, the Bull	April 20	♉	109
		Gemini, the Twins	May 21	♊	94
	Summer.	*Cancer*, the Crab	June 21	♋	75
		Leo, the Lion	July 23	♌	91
		Virgo, the Virgin	Aug. 23	♍	93
Southern Signs.	*Autumn.*	*Libra*, the Balance	Sept. 22	♎	33
		Scorpio, the Scorpion	Oct. 23	♏	44
		Sagittarius, the Archer	Nov. 22	♐	48
	Winter.	*Capricornus*, the Goat	Dec. 21	♑	58
		Aquarius, the Waterman	Jan. 20	♒	93
		Piſces, the Fiſhes	Feb. 18	♓	110

SOUTHERN CONSTELLATIONS.

Cetus, or *Balenus* the Whale	80
Eridanus, the River Po	72
Phenix	13
Toucan, the American Gooſe	9
Orion	93
Monoceros, the Unicorn	32
Canis Minor, the Little Dog	14
Hydra	53
Sextans, the Sextant	4
Crater, the Cup	11
Corvus, the Crow	8
Centaurus, the Centaur	36
Lupus, the Wolf	36
Ara, the Altar	9

Triangulum Auſtralis, the Southern Triangle	5
Apus, *Avis Indica*, the Bird of Paradiſe	11
Pavo, the Peacock	14
Corona Auſtralis, the Southern Crown	12
Grus, the Crane	14
Piſces Auſtralis, the Southern Fiſh	15
Lepus, the Hare	25
Columba Noachi, Noah's Dove	10
Robur Carolinum, Royal Oak	13
Argo, the Ship	48
Canis Major, the Great Dog	29
Apis, the Bee	4
Hirundo, the Swallow	11
Indus, the Indian	12
Chamelion	10
Piſces Volans, the Flying Fiſh	7
Dorado, or *Xiphias*, the Sword Fiſh	7
Hydrus, the Water Snake	10

Beſides the names of the Conſtellations, particular appellations are given to ſmall collections of ſtars, and to ſome of the moſt remarkable ſingle ones. Thus, the cluſter of ſmall ſtars in the neck of Taurus, is called the *Pleiades*; the 5 ſtars in the Bull's Face, the *Hyades*; the 7 ſtars in the Great Bear, *Charles's Wain*; the ſtar in the extremity of the tail of the Little Bear, the *North Pole Star*: the bright ſtar in the breaſt of Leo, the *Lion's Heart*; the large ſtar between the knees of Bootes, *Arcturus*; the large ſtar in the left ſhoulder of Auriga, *Capella*; and that in the mouth of Canis Major, is called *Sirius*; which is ſuppoſed to be more than 18 billions of miles from the earth, and is reckoned to be the neareſt ſtar to it.

Thoſe ſtars that admit of no regular arrangement, or being included in any conſtellation, are called *unformed ſtars*; and others, from their appearing in cloudy cluſters or ſpots, are comprized under the name of *Nebulæ*.

New ſtars ſometimes appear, while others diſappear. A change of place has alſo been obſerved in ſome of them. The ſtars in the ſouthern hemiſphere are inviſible to thoſe who inhabit the northern one, and the contrary.

That large irregular zone, or band of light obſervable in the heavens is called the *Galaxy*, or *Milky way*, on account of its ſhining whiteneſs: it is ſuppoſed by ſome to be one continued cluſter of ſmall ſtars, combining their light to illuminate that part of the heavens; while others imagine it to be a lucid medium, continually diffuſed through the ether in particular directions.

The ſpace in which the planets move ſeems to be void of all matter that can afford reſiſtance; for they continue to move with their uſual velocity: and are kept revolving round the ſun in their reſpective orbits by two forces, named *Centripetal* and *Centrifugal*: by the former they are conſtantly drawn towards the center of the ſun, and by the latter they always endeavour to fly off in tangents or ſtraight lines to their orbits. Now theſe forces or powers are ſo wonderfully adjuſted to each other, that the planets partake of the direction of neither, but are compelled to move in circular or elliptical orbits, or paths between them; in the ſame manner as a pebble whirls round the hand in a ſling.

Having thus endeavoured to give a general idea of the moſt intereſting parts of Aſtronomy, I ſhall conclude this ſubject with the following remarks.—The ſun is a ſtupendous body, placed in the center of our ſyſtem, round whoſe orb, the planets, ſatellites and comets perform their revolutions with an order and regularity that muſt fill our minds with the moſt exalted ideas of their divine creator.

And that this glorious ſyſtem, with all its ſuperb furniture, is only a ſmall part of the univerſe; for inſtead of one ſun and one world, there are ſuch innumerable number of ſuns, ſyſtems and worlds, diſperſed through infinite ſpace, that our ſolar ſyſtem, compared with the whole, is no more than a point or atom, which if it could be wholly annihilated, would be no more miſſed by an eye that could take in the whole creation, than a grain of ſand from the ſea ſhore.

By this unbounded view of nature, and the immenſity of the works of creation, our faculties are overpowered, and we are ready to exclaim with the pſalmiſt, "Lord, what is man, that thou art mindful of him, or the ſon of man, that thou regardeſt him."

THE USE

OF THE GLOBES.

DEFINITIONS.

THE Globes are two ſpherical bodies, named *Terreſtial* and *Celeſtial*, the convex ſurfaces of which are ſuppoſed to give a true repreſentation of the earth and heavens.

The *Terreſtial Globe* has delineated on its convexity the whole ſurface of the earth and ſea, in their relative ſize, form and ſituation.

The *Celeſtial Globe* has drawn on its ſurface the images of the ſeveral conſtellations and the principal ſtars, according to their relative magnitudes and poſitions which they are obſerved to have in the heavens.

And on both Globes are drawn the circles of the ſphere, viz. the *Equinoctial*, *Ecliptic*, *Tropics*, *Polar Circles*, *Parallels*

rallels of Latitude, *Meridians*, or *Hour Circles*, *Spiral Rhomb Lines*, flowing from ſeveral centers, called *flies*, &c.

The appendages to the Globes, are the *Brazen Meridian*, the *Horrary*, or *Hour Circle*, the *Horizon*, the *Quadrant of Altitude*, the *Mariners' Compaſs*, &c. By means of which a great variety of Problems in Geography and Aſtronomy are eaſily ſolved without the trouble of long and tedious calculations.

In uſing the Globes, keep the eaſt ſide of the horizon towards you (unleſs the problem requires it ſhould be otherwiſe) then you will have the graduated ſide of the meridian in view, and the quadrant of altitude before you.

The following Problems are ſelected as ſome of the moſt uſeful and general: and to ſeveral of them are annexed directions for ſolving them by common maps.

TERRESTIAL GLOBE.

PROBLEM I.

To find the Latitude and Longitude of any place.

Bring the given place to the graduated ſide of the braſs meridian; the degree over it ſhews the latitude, and the degree on the equator under the meridian, ſhews the longitude.

Examples.—What is the latitude and longitude of London, Botany-Bay, and the ſouthern extremity of Africa?

Note.—This Problem may be ſolved by a map thus;—Obſerve the diſtance of the given place from the neareſt parallel of latitude, and the ſame proportionable diſtance on either the right or left hand ſide of the map from the ſame parallel, will point out the latitude. And by obſerving what diſtance the given place is from the neareſt meridian, the ſame proportionable diſtance either at the top or bottom of the map, being taken from the ſame meridian, will point out the longitude.

PROBLEM II.

To find any place on the Globe, when its latitude and longitude are given.

Bring the given degree of longitude found on the equator to the meridian; then under the given latitude is the place required.

Examples.—What city is that whoſe latitude is 28° 12′ north, and longitude 16° 24′ weſt. And in what iſland is that city ſituated, whoſe latitude is 53°½ north, and longitude 6° weſt?

Note.—By the map. Find the given latitude on the right and left hand ſides of the map, and the longitude at the top and bottom; then with a pencil trace a parallel of latitude, and a circle of longitude, through theſe points, and where they interſect each other, will be the place required.

PROBLEM III.

To find the diſtance and bearing of any two places on the Globe.

Lay the graduated edge of the quadrant of altitude over both places, and the number of degrees between them being multiplied by 60, or 69½, will give the diſtance in geographical or Engliſh miles.

And

And by obſerving, while the quadrant lies in this poſition, what point of the compaſs runs parallel to the edge of the quadrant, you will have the rhomb, that ſhews the bearing ſought.

Examples.—What is the bearing and diſtance of London from Rome, and of Vienna from Liſbon?

Note.—By the map. Meaſure the ſpace between the two places with a pair of compaſſes, apply it to the ſide of the map, and reduce the number of degrees it contains into miles, by multiplying as before.

PROBLEM IV.

To find what number of miles are equal to a degree of longitude in any latitude.

Take the diſtance between two meridians at the given latitude, with a pair of compaſſes, and apply it to the equator. Then ſay, as the diſtance in degrees between the meridians, is to the number of degrees it meaſures on the equator, ſo is one degree at the given place, to the number of miles it contains in that latitude.

Examples.—How many miles anſwer to a degree of longitude in 24, 40 and 70 degrees of north, or ſouth latitude?

Note.—The ſolution of this problem by the map is exactly the ſame as by the globe. From the inclination of the meridians as they increaſe in diſtance from the equator, it is evident, that the degrees on the parallels of latitude muſt conſtantly decreaſe from the equator to the poles, where the meridians all meet in a point. And hence it is, that a degree of longitude is no where the ſame, but upon the ſame parallel, and that upon the equator only, a degree of longitude is equal to a degree of latitude.

PROBLEM V.

The time of the day being given at any place; to find the correſponding time at any other place.

Bring the place where the time is given to the meridian and ſet the hour index to the given time; (which is eaſily done by obſerving that the upper 12 repreſents noon, and that the globe turns on its axis from weſt to eaſt), then bring the other place to the meridian, and the index will point to the required time. If the place where the time is required is ſituated weſtward of the other, it has noon later than the other, if eaſtward, ſooner.

Examples.—When it is noon at London, what o'clock is it at Venice, Conſtantinople and Lima?

Note.—By the map. Divide the number of degrees of longitude between the two places by 15; then, if the place where the time is required be eaſtward of the other, add the quotient to the given time; if weſtward, ſubtract it, and you will have the hour of the day either before, or after noon.

PROBLEM VI.

To find the Antæci, Periæci and Antipodes of any place.

Bring the given place to the meridian, then in the other hemiſphere under the ſame degree of latitude is the place of the Antæci.

While the given place is under the meridian, ſet the index to the upper 12, and turn the globe till it points to the lower 12, then under the ſame degree of latitude is the place of the Periæci.

The globe remaining in the laſt poſition, ſeek on the contrary ſide of the equator for the given latitude, and the point under the meridian thus found will be the Antipodes to the given place.

Examples.—What places on the globe are Antœci, Periæci, and Antipodes to the cities of London, Vienna and Boſton?

PROBLEM VII.

To repreſent a parallel ſphere, a right ſphere, and an oblique ſphere.

Turn the braſs meridian till the equator is in the plane of the horizon, the parallels will then coincide with the horizon, as they do with the equator, and form a parallel ſphere.

Turn the meridian till the poles are in the horizon, the parallels will then be at right angles to the horizon, and form a right ſphere.

Let the globe be in any ſituation (except the two laſt) and it will form an oblique ſphere.

PROBLEM VIII.

To find the ſun's place, declination, and the places to which he will be vertical on any given day.

Look for the given day on the wooden horizon, and againſt it is the ſign and degree of the ecliptic which the ſun is in at that time; find the ſame ſign and degree on the ecliptic line on the globe, and bring it to the meridian, the degree over it will be the ſun's declination, and all places which paſs under the ſame degree when the globe is turned on its axis, will have the ſun vertical on the given day.

Examples.—What is the ſun's place in the ecliptic, his declination, and to what places on the globe will he be vertical on the 12th of January and the 4th of Auguſt?

Note.—By the map. Seek for the given month in the table of the ſigns in the zodiac, and ſee on what day the ſun enters the ſign anſwering to it; and as the ſun moves nearly one degree per day, it will be eaſy to reckon how many degrees he is advanced in that ſign: then find the ſame ſign and degree on the ecliptic line in a map of the world, and with a pair of compaſſes, take its neareſt diſtance to the equator, and apply it to the ſide of the map, you will then have the declination; and all places under that parallel of latitude will have the ſun vertical that day.

PROBLEM IX.

The day and hour at any place being given; to find where the ſun is vertical at that time.

Find the ſun's declination, then bring the given place to the meridian and ſet the index to the preciſe time; turn the globe on its axis till the index points to the upper 12, and the place that is then under the ſame degree of the meridian which anſwers to the ſun's declination, has the ſun vertical at that time.

Examples.—What places on the globe will the ſun be over on the 25th of April, when it is 4 o'clock at London; and on the 16th of Auguſt, when it is 10 o'clock in the morning at Rome?

PROBLEM X.

To rectiſy the globe for the latitude, zenith and ſun's place on any given day.

Move the meridian till the north or ſouth pole be elevated as many degrees above the horizon as are equal to the latitude of the given place; then is the globe rectified for the latitude.

Reckon the ſame latitude from the equator towards the elevated pole, there ſcrew on the quadrant of altitude, and the rectification is made for the zenith.

Next bring the ſun's place to the meridian, ſet the index to the upper 12, and the globe is rectified for the ſun's ſouthing at noon; and properly adjuſted for working problems where altitudes, &c. are ſought.

Examples.—Rectify the globe for the latitude, zenith and ſun's place on the 10th of June for London; and on the 20th of September for Conſtantinople.

Note.—The celeſtial globe is rectified in the ſame manner as the terreſtial.

PROBLEM XI.

The latitude of a place being given; to find the time of the ſun's riſing and ſetting, and the length of the day and night at any time.

Rectify the globe for the latitude and the noon; bring the ſun's place to the eaſtern ſide of the horizon, the index will then point to the hour of its riſing; and when brought to the weſtern ſide, will ſhow the hour of its ſetting. The time of ſetting being doubled, gives the length of the day, and the time of his riſing being doubled, gives the length of the night.

Examples.—At what time will the ſun riſe and ſet at London, Madrid and Lima, on the 20th of May and the 16th of November. And what is the length of the day and night at each place, at thoſe times?

PROBLEM XII.

To find the length of the longeſt day or night at any place between the equator and the polar circles.

Rectify the globe for the latitude, bring the ſolſtitial point of that hemiſphere to the eaſtern part of the horizon, ſet the index to 12 at noon, and turn the globe till the ſolſtitial point comes to the weſtern ſide of the horizon, the hours paſt over by the index will give the length of the longeſt day or night; and its complement to 24 hours will give the length of the ſhorteſt night or day.

Examples.—What is the length of the longeſt day and ſhorteſt night at the cities of London, Quebec, and at the iſland of St. Helena?

PROBLEM XIII.

A place being given in one of the frigid zones; to find what number of days (of 24 hours each) the ſun conſtantly ſhines upon the ſaid place, and what number of days he is abſent; alſo the firſt and laſt day of his appearance.

Rectify the globe for the latitude of the given place, count the ſame number of degrees upon the meridian from each ſide of the equator as the place is diſtant from the pole, and mark the place where the reckoning ends. Turn the globe and obſerve what two points of the firſt and ſecond quadrant of the ecliptic come under the northern mark: theſe found on the horizon will point out the firſt and laſt days of the ſun's appearance. In like manner obſerve what two points of the third and fourth quadrant of the ecliptic, cut the ſouthern mark; find theſe points on the horizon, and the number of days between them will be the time the ſun is totally abſent.

Examples.—How many days will the ſun conſtantly appear at, and how many will he depart from the north cape of Lapland, in 71° north latitude?

PROBLEM XIV.

To find what climate any place is in between the equator and polar circles.

Find the length of the longeſt day at the given place by Problem 12, from which deduct 12 hours; multiply the remainder by 2, and the product will be the number of the climate.

Examples.—In what climates are the cities of London, Liſbon, Berlin and Conſtantinople ſituated?

PROBLEM XV.

The day and hour being given; to find all thoſe places of the earth where the ſun is then riſing and ſetting; where it is noon, midnight and twilight.

Find the place where the ſun is vertical at the given time, by Problem 9, rectify the globe for the latitude of that place, and bring it to the meridian.—Then all thoſe places that are in the weſtern half of the horizon have the ſun riſing, and thoſe in the eaſtern half have it ſetting. To thoſe under the upper part of the meridian it is noon, and to thoſe under the lower part of it 'tis midnight. Thoſe places which are leſs than 18 degrees below the horizon have twilight, and thoſe which are more than 18° below it have dark night.

Examples.—On the 25th of April and the 4th of Auguſt, at 6 o'clock in the evening, at London, what places will have the ſun riſing, ſetting, noon, midnight and twilight?

PROBLEM XVI.

To find the hour, &c. when the morning and evening twilight begins and ends, in any latitude leſs than 48 ½ *degrees.*

Rectify the globe for the latitude, bring the ſun's place to the meridian, and ſet the index to 12 at noon. Turn the globe about towards the eaſt till the ſun's place be 18 degrees below the horizon, and the index will ſhew the time of day-break, or the beginning of twilight. Then turn the globe weſtward till the ſun's place in the ecliptic be 18 degrees below the horizon, and the index will ſhew the time when twilight ends.

Examples.—When will twilight begin and endat Gibraltar on the 10th of May and the 20th of November?

Note.—When the ſun does not go 18 degrees below the horizon, the twilight continues the whole night. Places that have leſs latitude than 48 ½ degrees, have always dark night between the time of ſun-ſetting and ſun-riſing; but greater latitudes have dark night only at certain times of the year. At the north pole the dark night continues from the 13th of November to the 28th of January; and at the ſouth pole from May the 12th to Auguſt the 1ſt, at all other times the poles have either continual twilight, or continual day-light.

PROBLEM XVII.

To find the time in which continual twilight begins and ends in any given latitude greater than 48 ½ degrees.

Rectify the globe for the given latitude, and note the point of the meridian which is exactly 18 degrees beneath the part of the horizon next to the elevated pole, and as the globe is turning on its axis obſerve the two points of the ecliptic which paſs under the degree noted; the two days anſwering to the two points of the ecliptic will be the days ſought.

Examples.—When will continual twilight begin and end at London, and at the north cape in Lapland?

PROBLEM XVIII.

The latitude, hour of the day and the ſun's place being given; to find the ſun's altitude and azimuth, or number of degrees he is diſtant from the meridian.

Rectify the globe for the latitude, zenith and noon. Turn the globe till the index points at the given hour; move the quadrant of altitude till its graduated edge coincides with the ſun's place, and the degrees from thence to the horizon ſhews the ſun's altitude at that time. Alſo the degree of the horizon cut by the quadrant is the ſun's azimuth, reckoned from the ſouth.

Example.—What is the altitude and azimuth of the ſun at Conſtantinople on the 20th of May, at twoo'clock in the afternoon?

PROBLEM XIX.

The latitude and day of the month being given; to find the ſun's meridian, altitude and amplitude, or point of the compaſs on which he riſes and ſets.

Rectify the globe for the latitude, zenith and noon; the number of degrees contained upon the meridian between the horizon and ſun's place is its meridian altitude. Then bring the ſun's place to the eaſtern ſide of the horizon, and the point of the compaſs againſt it is his amplitude at riſing: and if the ſun's place be turned to the weſtern ſide of the horizon, it will cut the point of his amplitude at ſetting.

Example.—What is the meridian altitude and amplitude of the ſun at London on the 4th of May?

PROBLEM XX.

The day and hour of a lunar eclipſe being given; to find all thoſe places of the earth to which it will be viſible.

Find the place to which the ſun is vertical at the time of the eclipſe, and bring the antipodes, or country oppoſite to that place, to the zenith: then the eclipſe will be ſeen in all places above the horizon at that time.

Note.—An eclipſe of the ſun is not to be ſhown with any degree of certainty by a common globe, becauſe the moon's ſhadow covers but a ſmall portion of the earth's ſurface, and her declination from the ecliptic throws her ſhadow ſo variouſly upon the earth, that to determine the places on which it falls, recourſe muſt be had to calculations.

CELESTIAL GLOBE.

PROBLEM I.

To repreſent the face of the heavens as ſeen from any given place on the earth at any hour of the night.

Rectify the globe for the given latitude, zenith and ſun's place, and turn it about till the index points to the given hour, then the upper hemiſphere will repreſent the viſible half of the heavens for that time; all the ſtars upon the globe being then in ſuch ſituation as to correſpond exactly with thoſe in the heavens.

If the globe be placed due north and ſouth by means of the compaſs, every ſtar on the globe will point towards the like ſtar in the heavens, by which means the conſtellations and remarkable ſtars may be eaſily known. All thoſe ſtars which are in the eaſtern ſide of the horizon, are then riſing in the eaſtern ſide of the heavens; all thoſe in the weſtern are ſetting in the weſtern ſide of the heavens; and all thoſe under the meridian are culminating. If the globe be turned ſlowly on its axis from eaſt to weſt, the index will ſucceſſively point out the times the different ſtars riſe, culminate, and ſet.

Examples.—Repreſent the face of the heavens at London on the 12th of Auguſt, at 10 o'clock in the evening, and on the 16th of September, at 11 in the evening.

Note.—When the globe is to be placed due north or ſouth by the compaſs, allowance muſt be made for the variation, which is about 23¼ degrees weſterly at this time, and is increaſing.

PROBLEM II.

To find the latitude and longitude of a fixed ſtar.

Put the center of the quadrant of altitude on the pole of the ecliptic, and its graduated edge on the given ſtar: then the latitude is ſhewn by the degrees between the ecliptic and ſtar. And the longitude is the degrees cut on the ecliptic by the quadrant.

Example.—What is the latitude and longitude of Aldebaran?

Note.—If the latitude and longitude of a fixed ſtar be given to find its ſituation, it will be found by the converſe of this Problem.—Alſo the right aſcenſion and declination of any fixed ſtar is found in the ſame manner as latitude and longitude, on the terreſtial globe.

PROBLEM III.

To find at what time of the year a given ſtar will be upon the meridian at a given hour of the night.

Bring the ſtar to the meridian, and ſet the index to the given hour, then turn the globe on its axis till the index points to 12 at noon, the ſun's place in the ecliptic will then be under the meridian, and its correſponding day will be the time ſought, which day may eaſily be found againſt the like place of the ſun amongſt the ſigns on the wooden horizon.

Examples.—When will the ſtars Aldebaran and Capella upon the meridian at 10 o'clock at night?

PROBLEM IV.

To find the hour of the night by the altitude of any known ſtar.

Rectiſy the globe for the latitude, ſun's place and zenith, then turn the globe and quadrant till the ſtar is under the given degree of altitude, and the index will point to the time ſought.

Example.—What o'clock is it when Aldebaran is elevated 16° above the horizon?

PROBLEM V.

The latitude of the place and day of the month being given; to find the time when any known ſtar will riſe, be on the meridian, or ſet.

Having rectified the globe, turn it about till the given ſtar comes to the eaſtern ſide of the horizon, and the index will ſhew the time of the ſtars riſing. Bring it to the meridian, and the index will point to its time of culminating, or coming to the meridian. And bring it to the weſtern part of the horizon, and the index will point to its time of ſetting.

Examples.—At London on the 24th of September and the 4th of October, when will the following ſtars riſe, culminate and ſet, viz. the Pleiades and Aldebaran, in Taurus; Arcturus, in the Skirts of Bootes; Caſtor, in Gemini; Bellatrix, in Orion; Alcair, in Aquila; and Deneb, in the tail of Leo Major?

Note.—Thoſe ſtars which are leſs diſtant from the elevated pole than the latitude in, are conſtantly above the horizon, and thoſe ſtars which are leſs diſtant from the depreſſed pole, than the latitude in, is from the elevated pole, are conſtantly beneath the horizon.

PROBLEM VI.

To find the place of the moon, or any planet, and the time of its riſing, ſouthing, ſetting, &c. at any time.

Find the latitude and longitude of the moon or planet for the given day by an Ephemeris, then place the firſt degree of the quadrant of altitude upon that degree of the ecliptic which expreſſes the given longitude, and the 90th degree on the pole of the ecliptic, the point of the globe which is under that degree of the quadrant which expreſſes the given latitude, is the place required.

Then rectify the globe for the latitude, ſun's place and zenith, and turn it on its axis, as the place comes to the eaſtern ſide of the horizon to the meridian, and to the weſtern ſide, the index will ſhew at what time the moon or planet riſes, culminates and ſets, in the ſame manner as it would do for a fixed ſtar.

Examples.—When will the moon riſe, come to the meridian and ſet at London on the 10th of Auguſt, the 8th of December, and the 12th of January?

PROBLEM

PROBLEM VII.

To find whether Venus be an evening or morning ſtar at any given time.

If the place of Venus for the given time be found in an Ephemeris, and marked upon the zodiac, and alſo the place of the ſun for the ſame time, then, by obſerving whether ſhe riſes before the ſun or ſets after him, it may be ſeen whether ſhe then be a morning or evening ſtar.

Examples.—Is Venus an evening or morning ſtar on the 10th of January and the 15th of September?

PROBLEM VIII.

Of the Phænomena of the Harveſt Moon.

The phænomena of the harveſt moon, which happen about the time of the autumnal equinox, may be ſhewn by finding its latitude and longitude in an Ephemeris, marking its place on the zodiac of the globe for two or three evenings before and after the full, and exhibiting its times of riſing, by rectifying the globe for the ſun's place, and bringing it to the eaſtern part of the horizon, you will then find that the moon riſes very ſoon after ſun-ſet for ſeveral evenings together.

Note.—It is generally believed that the moon riſes about 50 minutes later every day than on the preceding; but this is true only with regard to places on the equator. In places of conſiderable latitude there is a remarkable difference, eſpecially in the harveſt time. At the polar circles where the mild ſeaſon is of very ſhort duration, the autumnal moon riſes at ſun-ſet from the firſt to the third quarter. And at the poles where the ſun is for half a year abſent, the winter full moons ſhine conſtantly without ſetting from the firſt to the third quarter. All theſe phænomena are owing to the different angles made by the horizon, and different parts of the moon's orbit.

PROBLEM IX.

To find whether a clock be well regulated to mean time.

Obſerve if it ſhews exactly 23 hours, 56 minutes, 4 ſeconds, from the inſtant of any ſtar's paſſage through a fixed point, to that of its return to the ſame point: by what the clock exceeds this, it is faſter; by what it wants thereof, it is ſlower than mean time.

If at any time you would ſet a clock or watch by a ſun dial, you muſt make uſe of an equation table, which ſhews for every day in the year, how many minutes or ſeconds the ſun is before or behind the clock; the difference is called the equation of time.

PROBLEM X.

Of the difference of time between a well regulated clock and a true ſun dial.

The reaſon why the ſun and clock vary may be ſhewn by means of a globe, thus; if a ſmall black patch be put on every 10th or 15th degree, both of the equator and ecliptic, beginning at Aries, and the globe be turned ſlowly round to the weſtward, you will ſee all the patches from Aries to Cancer, come to the meridian ſooner than the correſponding patches on the equator; all thoſe from Cancer to Libra will come to the meridian later than their correſponding patches on the equator; thoſe from Libra to Capricorn ſooner; and thoſe from Capricorn to Aries later: whilſt the patches at the beginning of Aries, Cancer, Libra, and Capricorn, being even with thoſe on the Equator, ſhow that the ſun (which the patches on the ecliptic repreſent), and the clock (which thoſe on the equator repreſent) either meet there, or are even with one another, and ſo come to the meridian at the ſame time.

PROBLEM XI.

To conſtruct a horizontal dial for any latitude, by means of a common globe.

A common globe of 12 inches diameter has generally 24 meridian ſemicircles drawn upon it. If ſuch a globe be elevated to the latitude of any given place, and turned about till one of theſe meridians cuts the horizon in the north point, where the hour of 12 is ſuppoſed to be marked, the reſt of the meridians will cut the horizon at the reſpective diſtances of all the other hours from 12.

Then if theſe points of diſtance be marked on the horizon, and the globe be taken out of the horizon, and a flat board or plate be put into its place, even with the ſurface of the horizon; and if ſtraight lines be drawn from the center of the board, to thoſe points of diſtance on the horizon which were cut by the 24 meridian ſemicircles; theſe lines will be the hour lines of a horizontal dial for that latitude.

The edge of the gnomon or index muſt be in the very ſame ſituation that the axis of the globe was before it was taken out of the horizon; that is, the gnomon muſt make an angle with the plane of the dial, equal to the latitude of the place for which the dial is made.

Example.—Conſtruct a horizontal dial for the latitude of 51 degrees 40 minutes north.

PROBLEM XII.

How to make a true meridian line for the regulating of clocks and watches, and for the fixing of ſun-dials.

In the Temperate Zones the edge of the ſhadow of any thing ſtraight, and placed perpendicular to the horizon when it is exactly 12 o'clock by the ſun, will be a meridian line.

But when greater exactneſs is required (as in the placing of ſun dials) the following method from Ferguſon's Aſtronomy ought to be uſed.—Make 4 or 5 concentric circles about a quarter of an inch from one another, on a flat board, about a foot in breadth: and let the outmoſt circle be but little leſs than the board will contain. Fix a pin perpendicularly in the center, and of ſuch a length that its whole ſhadow may fall within the innermoſt circle for at leaſt 4 hours in the middle of the day.

The pin ought to be about the eighth part of an inch thick, and to have a round blunt point. The board ſet exactly level, in a place where the ſun ſhines, ſuppoſe from 8 in the morning till 4 in the afternoon, about which hours the end of the ſhadow ſhould fall without all the circles: watch the times in the forenoon when the extremity of the ſhortening ſhadow juſt touches the ſeveral circles, and there make marks; then, in the afternoon of the ſame day watch the lengthening ſhadow, and where its end touches the ſeveral circles, in going over them, make marks alſo.

Laſtly, with a pair of compaſſes find exactly the middle point between the two marks on any circle, and draw a ſtraight line from the center to that point, which line will be covered at noon by the ſhadow of a ſmall upright wire, which ſhould be put in the place of the pin. The reaſon for drawing ſeveral circles is, that in caſe one part of the day ſhould prove clear, and the other part ſomewhat cloudy, if you miſs the time when the point of the ſhadow ſhould touch one circle, you may perhaps catch it in touching another. The beſt time for drawing a meridian line in this manner is about the ſummer ſolſtice, becauſe the ſun changes his declination ſloweſt, and his altitude faſteſt, in the longeſt days.

A
CHRONOLOGICAL TABLE.

The following Table contains ſome of the moſt remarkable Events in General Hiſtory and Diſcoveries in Geography and Aſtronomy; interſperſed with uſeful Remarks and Obſervations.

Before Chriſt.

4004 THE Creation of the World.

2348 The Old World deſtroyed by a deluge which continued 377 days.

2247 About this time, *Noah* is with great probability ſuppoſed to have parted from his rebellious offspring, and to have led a colony of ſome of the more tractable into the eaſt, and there either he, or one of his ſucceſſors, to have founded the ancient *Chineſe Monarchy*.

2234 The celeſtial obſervations are begun at *Babylon*, the city which firſt gave birth to learning and the ſciences.

2188 *Miſraim*, the ſon of *Ham*, founds the kingdom of Egypt, which laſted 1663 years.

2059 *Ninus*, the ſon of *Belus*, founds the kingdom of *Aſſyria*, which laſted 1000 years, and out of its ruins were formed the Aſſyrians of Babylon, thoſe of *Ninevah*, and the kingdom of the *Medes*.

1856 The kingdom of *Argos*, in Greece, begins under Inachus.

1556 Cecrops begins the kingdom of *Athens*, in Greece.

1546 Scamandar, from Crete, begins the kingdom of *Troy*.

1493 *Cadmus* carried the Phenician letters into Greece and built Thebes.

1490 *Sparta* built by Lacedemon.

1485 The firſt ſhip that appeared in Greece was brought from Egypt.

1453 The firſt olympic games celebrated at *Olympia* in Greece.

1406 *Iron* is found in Greece from the accidental burning of the woods.

1326 The *Iſthmian* games inſtituted at Corinth.

1294 The firſt colony came from Italy into Sicily.

1243 A colony of Arcadians conducted by *Evandtr* into Italy.

1225 The *Argonautic* expedition.

1104 The expedition of the *Heraclidæ* into Peloponneſus.

1102 The kingdom of *Sparta* commenced.

986 *Samos* and *Utica*, in Africa, built.

873 The art of ſculpture in marble found out.

869 The city of Carthage, in Africa, founded by Queen *Dido*.

814 The kingdom of *Macedon* begins.

799 The kingdom of *Lydia* begins.

776 The firſt *Olympiad* begins.—The Olympiad was a ſpace of 4 years whereby the Greeks reckoned time, it was univerſally adopted in Greece, and continued till the 440th year of the chriſtian æra; and has been found extremely uſeful in fixing the time of many momentous events. Before this method of computation was obſerved, every page of hiſtory is moſtly fabulous, and filled with obſcurity and contradiction.—*To find what Olympiad any year is in*—Divide the number of years between the firſt Olympiad and the given time by 4, and the quotient will be the number of the Olympiads.

753 The æra of the building of Rome, in Italy, by *Romulus*.—Rome was firſt governed by Kings; then Conſuls or Magiſtrates; and laſtly by Emperors.

720 The firſt eclipſe of the moon on record.

658 *Byzantium* (now Conſtantinople) built by a colony of Athenians.

604 By order of *Necho*, King of Egypt, ſome Phenicians ſailed from the Red Sea round Africa, and returned by the Mediterranean.

600 *Thales*, of Miletus, travels into Egypt, conſults the Prieſts of Memphis, acquires the knowledge of Geometry, Aſtronomy and Philoſophy; returns to Greece, calculates eclipſes, gives general notions of the univerſe, and maintains that one ſupreme intelligence regulates all its motions.

—— Maps, globes, and the ſigns of the zodiac invented by *Anaximander*, the ſcholar of Thales.

588 The firſt irruption of the Gauls into Italy.

559 *Cyrus* the firſt King of Perſia.

526 Learning is greatly encouraged at Athens, and a public library firſt founded.

509 *Tarquin*, the ſeventh and laſt King of the Romans, is expelled, and Rome is governed by two Conſuls, till the battle of Pharſalia, being a ſpace of 461 years.

500 *Pythagoras*, a Grecian Philoſopher, flouriſhed about this time, and is ſaid to have had juſt ideas of the doctrine of the planetary ſyſtem.

490 The battle of Marathon gained by *Miltiades*, with ten thouſand Athenians, againſt one hundred and ten thouſand Perſians.

481 *Xerxes*, King of Perſia, begins his expedition againſt Greece.

480 The defence of Thermopylæ by *Leonidas*, and the ſea fight at Salamis.

454 The Romans ſend to Athens for *Solon's* laws.

432 The *Metonic*, or *Lunar Cycle*, or *Golden Number*, began July 15th, and is a revolution of 19 years; in which time the conjunctions, oppoſitions and other aſpects of the moon, are within 1 ½ hour of being the ſame as they were on the ſame days of the months 19 years before.—*To find the year of the Lunar Cycle*—Add 1 to the given year of Chriſt, and divide by 19, the quotient is the number of cycles elapſed in the interval, and the remainder is the cycle for the given year. If nothing remains, the cycle is 19.

431 The Peloponneſian war began and laſted 27 years.

401 The retreat of the 10,000 Greeks under *Zenophon*. The 30 tyrants expelled from Athens, and Democratic Government reſtored.

400 *Socrates*, the founder of moral philoſophy among the Greeks, believes the immortality of the ſoul, a ſtate of rewards and puniſhments, for which and other ſublime doctrines, he is put to death by the Athenians, who ſoon after repent, and erect to his memory a ſtatue of braſs.

377 A general conſpiracy of the Greek States againſt the Lacedemonians

359 The obliquity of the ecliptic obſerved to be 23° 49′ 10″.

357 A tranſit of the moon over Mars obſerved.

356 Birth of *Alexander* the Great.

336 The Grecian Monarchy commenced under *Philip of Macedon*, father of Alexander.

334 The Perſians defeated at Granicus, May 22d.

331 *Alexander* takes Babylon, and the principal cities in Perſia.

293 The firſt ſun-dial erected at Rome by *Papirius Curſor*.

285 *Dionyſius*, of Alexandria, began his Aſtronomical Æra on Monday, June 26th, being the firſt who found the exact ſolar year to conſiſt of 365 days, 5 hours and 49 minutes.

—— The *Cycle of the Sun*, is a revolution of 28 years, in which time the days of the months return again to the ſame days of the week; the ſun's place to the ſame ſigns and degrees of the ecliptic on the ſame months and days, ſo as not to differ one degree in 100 years. —*To find the year of the Solar Cycle*—Add 9 to the given year of Chriſt, and divide by 28, the quotient is the number of cycles elapſed ſince his birth, and the remainder is the cycle for the given year. If nothing remains, the cycle is 28.

280 *Pyrrhus* invades Italy.

262 A tranſit of Mercury over the Bull's horn; the planet being in 23° of ♉, and the ſun in 29° 30′ ♈.

255 *Regulus*, the Roman Conſul, defeated and taken priſoner by the Carthaginians under *Xantippus*. His behaviour on this occaſion may give us an idea of the ſpirit which then animated the Romans; being ſent back on his parole to negociate a change of priſoners, he maintained in the Senate the propriety of that law, which cut off from thoſe who ſuffer themſelves to be taken priſoners, all hopes of being ſaved; and returned to Africa to ſuffer a cruel death.

237 *Hamilcar*, the Carthaginian, cauſes his ſon *Hannibal*, at 9 years old, to ſwear eternal enmity to the Romans; of all the enemies Rome ever had to contend with, Hannibal was the moſt inflexible and dangerous.

236 The Tartars expelled from China.

231 Corſica and Sardinia ſubdued by the Romans.

224 The *Coloſſus*, at Rhodes, overturned by an Earthquake.

218 The commencement of the ſecond Punic War.

214 *Syracuſe* beſieged by *Marcellus*, by ſea and land; but his operations proved long ineffectual; and the invention and induſtry of *Archimedes*, the celebrated mathematician, were able to baffle all the efforts, and to deſtroy all the great and ſtupendous machines and military engines of the Romans during three ſucceſſive years: ſuch are the wonderful powers of the ſciences when in the hands of men of great abilities.

202 Hannibal defeated by *Scipio* at Zama, in Africa.

190 The firſt Roman army enters Aſia, and from the ſpoils of *Antiochus* brings the Aſiatic luxury into Rome.

168 Macedon reduced to the form of a Roman province.

162 *Hipparchus* began his aſtronomical obſervations at Rhodes, and was the firſt who reduced the ſtars into a catalogue, daring, according to *Pliny*, to undertake a thing, which ſeemed to ſurpaſs the power of a Divinity, that is, to number the ſtars for poſterity, and to reduce them into order; his catalogue contained only 1026 ſtars.—Since his time liſts have been publiſhed by *Bayer*, *Flamſtead*, *De la Caille*, and the *Rev. Mr. Woolaſton*, which, when added together, are found to contain near 5000 ſtars, and are daily increaſing by the improvement of teleſcopes; for the more perfect theſe inſtruments are, the more ſtars we are able to examine.

150 The third Punic war commenced.

146 *Carthage*, the rival of Rome, is raſed to the ground by the Romans.

—— A remarkable comet appeared in Greece.

120 *Cteſebes* invented that uſeful machine called the Common, or Houſe Pump, which raiſes water about 31 or 32 feet: it is conſtructed upon the principle, that a column of water about 34 feet high is of equal weight with as thick a column of air from the earth to the top of the atmoſphere. This pump has within a few years been very much improved by the ingenious Mr. Taylor, of Southampton, and is now in general uſe in the Royal Navy; every friend to his country muſt rejoice to think, that the accidents to which

ſhips that ſpring a leak at ſea were liable, from the imperfections of the chain pump, are happily removed by this ingenious contrivance. A pump on this conſtruction, with a 7 inch bore, will heave 1 ton of water per minute, 24 feet high, with 10 men, 5 only working at a time; and one is now conſtructing by Mr. Taylor to heave 5 tons per minute, the ſame height; in ſhips where there are many men, this muſt be a moſt valuable machine.

52 *Julius Cæſar* makes his firſt expedition into Britain.

47 The battle of Pharſalia between *Cæſar* and *Pompey*, in which the latter is defeated.

45 *Julius Cæſar* introduced the civil year and months: they were regulated by the courſe of the ſun, and called the *Julian Account*, or *Old Stile*, which continued in uſe in moſt chriſtian ſtates till the year 1582; when *Pope Gregory* the 13th, finding the year not ſo perfect as it ought to have been, gave the kalendar its laſt reformation, which is now uſed in Europe, and found not to err 2 days in 5000 years, being called the *Gregorian*, or *New Stile*.

44 *Cæſar*, the greateſt of the Roman Conquerors, after having fought 50 pitched battles, and ſlain 1,192,000 men, is killed in the Senate Houſe by conſpirators.

19 Rome at the height of its glory.

8 Rome at this time is 50 miles in circumference, and contains 463,000 men fit to bear arms.

The Temple of Janus is ſhut by *Auguſtus*, as an emblem of univerſal peace, and *JESUS CHRIST* is born, on Monday, Dec. 25th.

After Chriſt.

1 The Chriſtian Æra commenced from January 1.

33 *Chriſt* was crucified April 3d.

39 A conjunction of Saturn, Jupiter and Mars.

43 *Claudius Cæſar's* expedition into Britain.

49 London is founded by the Romans.

51 *Caractacus*, the Britiſh King, is carried in chains to Rome.

59 *Nero* puts his mother and brothers to death, and perſecutes the Druids, in Britain.

79 *Herculaneum* and *Pompeii* overwhelmed by an eruption from Mount Veſuvius.

85 *Julius Agricola*, Governor of South Britain, to protect the civilized Britons from the incurſions of the Caledonians, builds a line of forts between the rivers Forth and Clyde; defeats the Caledonians under *Galgacus*, on the Grampian Hills; and firſt ſails round Britain, which he diſcovers to be an iſland.

121 The Caledonians reconquer from the Romans all the Southern Parts of Scotland; upon which the Emperor *Adrian* builds a wall between Newcaſtle and Carliſle; but this proving ineffectual, *Pollius Urbicus*, the Roman General, about the year 134, repairs Agricola's Forts, which he joins by a wall 4 yards thick.

130 *Ptolemy*, an Egyptian Philoſopher, ſuppoſed that the earth was fixed, and that the Moon, Mercury, Venus, the Sun, Mars, Jupiter, and Saturn, revolved round it in the order now mentioned.

209 *Severus's Wall*, in Britain, built.

218 Two comets appeared at Rome; the courſe of the moſt remarkable from eaſt to weſt.

253 Europe ravaged by the Scythians and Goths.

277 The Franks ſettled in Gaul.

284 The *Diocleſian* Æra commenced Auguſt 29th, or September 17th.

328 Conſtantine removes the ſeat of empire from Rome to Byzantium, which is thenceforward called *Conſtantinople.*

364 The Roman Empire is divided into the eaſtern (Conſtantinople the capital) and weſtern (of which Rome continued to be the capital) each being now under the government of different emperors.

390 A fiery column ſeen in the air for 30 days.

404 The Kingdom of Caledonia, or Scotland, revives under Fergus.

406 The *Vandals*, *Alans* and *Suevi*, ſpread into France and Spain, by a conceſſion of Honorius, Emperor of the Weſt.

409 Rome taken and plundered by the *Goths*, Aug. 24.

412 The Vandals begin their kingdom in Spain.

420 The Kingdom of France begins upon the Lower Rhine under *Pharamond.*

426 The Romans reduced to extremities at home, withdraw their troops from Britain, and never return; adviſing the Britons to arm in their own defence, and truſt to their own valour.

447 *Attila* (ſurnamed the ſcourge of God) with his Huns ravage the Roman Empire.

449 *Vortigern*, King of the Britons, invites the Saxons into Britain, againſt the Scots and Picts.

452 The City of Venice founded.

455 The *Saxons* having repulſed the Scots and Picts, invite over more of their countrymen, and begin to eſtabliſh themſelves in Kent, under *Hengiſt*.

476 The Weſtern Empire is finiſhed 523 years after the battle of Pharſalia; upon the ruins of which ſeveral new ſtates ariſe in Italy and other parts, conſiſting of Goths, Vandals, Huns and other Barbarians, under whom literature is extinguiſhed, and the works of the learned are deſtroyed.

508 Prince *Arthur* begins his reign over the Britons.

513 Conſtantinople beſieged by *Vitellius*, whoſe fleet is burnt by a ſpeculum of braſs made by *Proclus*.—And *Archimedes*, at the ſiege of Syracuſe, 214 years before Chriſt, is alſo ſaid to have deſtroyed the ſhips of *Marcellus* by a machine compoſed of ſpeculums, at the diſtance of a bow ſhot.—That the ancients made uſe of burning glaſſes is evident from a paſſage in a play of *Ariſtophanes*, where *Strepſiades* tells *Socrates*, that he had found out an excellent method to defeat his creditors, if they ſhould bring an action againſt him. His contrivance was, that he would get from the Jewellers a certain tranſparent ſtone, that was uſed for kindling fires, and then ſtanding at a diſtance, he would hold it to the ſun and melt down the wax on which the action was witten. But their power of burning at ſo great a diſtance was by many doubted and denied, till it was, in ſome degree, realized by *Buffon*, in the year 1747, who conſtructed a burning glaſs of 168 ſmall plain mirrors, which produced ſo conſiderable a degree of heat, as to ſet wood in flames at the diſtance of 209 feet, melt lead at 120, and ſilver at 50.

550 The Kingdom of Poland founded.

568 The Lombards founded a kingdom in Italy.

622 *Mahomet*, the falſe prophet, flies from Mecca to Medina, in Arabia, in the 44th year of his age and 10th of his miniſtry, when he laid the foundation of the Saracen Empire, and from whom the Mahometan Princes, to this day, claim their deſcent. His followers compute their time from this æra, which, in Arabic, is called *Hegira*, i. e. the Flight.

653 The Saracens now extend their conqueſts on every ſide, and retaliate the barbarities of the Goths and Vandals upon their poſterity.

685 The *Britons*, after a brave ſtruggle of near 150 years, are totally expelled by the Saxons, and driven into Wales and Cornwall.

698 The Saracens take Carthage and expel the Romans from Africa.

700 Cracow built, and the firſt Prince of Poland elected.

713 The Saracens conquer Spain.

797 Seventeen days of unuſual darkneſs.

800 *Charlemagne*, King of France, begins the Empire of Germany, afterwards called the Weſtern Empire, gives the preſent names to the winds and months; and endeavours to reſtore learning in Europe, but mankind are not yet diſpoſed for it, being ſolely engroſſed in military enterprizes.

807 January 31ſt Jupiter eclipſed by the moon. March 17th, a large ſpot ſeen on the ſun for 8 days.

842 Germany ſeparated from the Empire of the Franks.

874 Iceland peopled by the Norwegians.

875 A bearded comet appeared in France.

878 *Alfred*

896 *Alfred* the Great, after ſubduing the Daniſh invaders (againſt whom he fought 56 battles by ſea and land) compoſes his body of laws; divides England into counties, hundreds, tythings, &c. and founds the Univerſity of Oxford.

913 The Danes became maſters of England.

941 *Arithmetic* brought into Europe, and worked by letters, figures not uſed till 991.

1041 The Saxon line reſtored under *Edward* the Confeſſor.

1043 The Turks (a nation of adventurers from Tartary, ſerving hitherto in the armies of contending Princes) become formidable and take poſſeſſion of Perſia.

1055 The Turks take Bagdad, and overturn the Empire of the Saracens.

1066 The conqueſt of England by *William*, *Duke of Normandy*, in the battle of Haſtings, where Harold is ſlain.

1076 Aſia Minor, having been two years under the power of Solyman, is from this time called *Turkey*.

1091 The Saracens, in Spain, being hard preſſed by the Spaniards, call to their aſſiſtance Joſeph, King of Morocco, by which the *Moors* get poſſeſſion of all the Saracen dominions in Spain.

1119 Bohemia erected into a kingdom.

1132 The Kingdom of Portugal began.

1156 The city of Moſcow, in Ruſſia, founded.

1172 Henry II. takes poſſeſſion of Ireland.

1176 England is divided by Henry II. into 6 circuits, and juſtice is diſpenſed by itinerant Judges.

1186 A conjunction of all the planets at ſun riſe, Sept. 16th.

1204 The Inquiſition eſtabliſhed.

1209 The Pope excommunicates John, King of England.

1215 *Magna Charta* is ſigned by King John, and the Barons of England: and the Court of Common Pleas eſtabliſhed.

1220 *Aſtronomy* and *Geography* brought into Europe by the Moors.

1223 A comet of extraordinary magnitude appeared in Denmark.

1227 The Tartars, a new race of heroes, under *Gingis-Kan*, emerge from the northern parts of Aſia, overrun all the Saracen empire; and in imitation of former conquerors carry death and deſolation wherever they march.

1245 A clear red *Star*, like Mars, appears in Capricorn.

1253 The famous Aſtronomical Tables are compoſed by *Alonzo*, King of Caſtile.

1264 The Commons of England firſt ſummoned to Parliament about this time.

1269 The Hamburgh company incorporated in England.

1273 The Empire of the preſent Auſtrian family begins in Germany.

1279 King *Edward* renounces his right to Normandy.

1282 Wales ſubdued and united to England by Edward the Firſt.

1302 The *Mariner's Compaſs*, or *Magnetic Needle* invented or improved by *Givia*, of Naples; its variation or declination from the pole was diſcovered by *Seb. Cabot*, a Venetian, in 1500; the variation of that variation by *Gellibrand*, an Engliſhman, about the year 1625: and the dip or declination of the needle beneath the horizon, by *Norman*, another Engliſhman, in the year 1576. The *Loadſtone*, or *Natural Magnet*, is an iron ore, generally found in iron mines, of all forms and ſizes, and of various colours: it is endowed with the property of attracting iron, it points to the poles of the world, and communicates theſe properties by touch to iron, ſteel, &c. The powers of the magnet excited the wonders of the ancients, they were to them inexplicable, and remain ſo: and is a proof, that nature has many ſecrets, and that philoſophy, if contented with preſent knowledge, foregoes moſt valuable and intereſting diſcoveries, towards which, perhaps, the previous ſteps are already trodden.

1307 The beginning of the Swiſs Cantons.

1323 A great eruption of Mount Ætna.

1337 The firſt comet, whoſe courſe is deſcribed with an aſtronomical exactneſs.

1340 *Gunpowder* invented by a Monk, at Cologne. It is made of ſaltpetre, ſulphur and charcoal mixed together and granulated; when fired, it acts with a force 1000 times greater than the preſſure of the atmoſphere, and will cauſe a cannon ball to move at the rate of 8 miles in a minute.

1352 The Turks firſt enter Europe.

1358 *Tamerlane* began to reign in Perſia.

1378 Greenland diſcovered by a *Venetian.*

1405 The Canary Iſlands diſcovered by *Bathencourt*, a Norman.

1412 *Algebra* brought from Arabia into Europe.

1430 The art of printing invented about this time.

1453 Conſtantinople taken by the Turks, which ends the Eaſtern Empire 1123 years from its dedication by *Conſtantine* the Great, and 2206 years from the foundation of Rome.

1460 Engraving and etching on copper invented.

—— The Cape Verd Iſlands diſcovered by the Portugueſe.

1474 Printing with fuſile types introduced into England by Caxton.

1482 The coaſt of Guinea diſcovered by the Portugueſe.

1489 Maps and ſea charts firſt brought to England by Barth. Columbus.

1492 America firſt diſcovered by *Columbus*, a Genoeſe, in the ſervice of Spain.

1497 The Portugueſe firſt ſail to the Eaſt Indies by the Cape of Good Hope.

—— South America diſcovered by *Americus Veſpuſius*, from whom it has its name.

1499 North America diſcovered for Henry VII. by *Cabot*, a Venetian.

1500 Braſil diſcovered by the Portugueſe.

1502 Terra Firma diſcovered by a Spaniard.

—— Florida diſcovered by *John Cabot*, an Engliſhman.

1507 The Iſland of Madagaſcar diſcovered by the Portugueſe.

—— New Foundland diſcovered by *Sebaſtian Cabot*.

1517 Egypt is conquered by the Turks.

1518 Diſcovery of New Spain and the Streights of Magellan,

1519 The Iſland of Madeira diſcovered by the Portugueſe.

—— The firſt voyage round the world performed by a ſhip of Magellan's ſquadron.

1527 The Bermudas, or Summer Iſles, diſcovered by *John Bermudas*, a Spaniard, ſome ſay by *May*, an Engliſhman. In 1609, *Sir George Summer's* ſhip was wrecked on the rocks that ſurround them, and from him they received the name of Summer iſlands.

1529 The name of Proteſtant takes its riſe from the reformed proteſting againſt the Church of Rome, at the Diet of Spires, in Germany.

1530 About this time *Copernicus* adopted the Pythagorean, or true Syſtem of the Univerſe, but the general ideas of the world were not able to keep pace with thoſe of a refined philoſopher; he was threatened by the perſecution of religious bigotry; and his book on aſtronomy, after being ſuppreſſed for more than 36 years, was at length publiſhed, and a copy of it brought to him a few hours before his death.

1534 The Reformation takes place in England under Henry VIII.

1554 The Kingdom of *Aſtracan* conquered by the Ruſſians.

1555 The Ruſſian Company eſtabliſhed in England.

1560 The *Aurora Borealis*, *Northern Lights*, or *Streamers*, according to Dr. Halley, were firſt taken notice of. They are a kind of meteor appearing in the northern part of the heavens, moſtly in the winter time, and in froſty weather. In the arctic regions they appear in perfection; and in the Shetland Iſles, the *Merry-dancers*, as they are called, are the conſtant attendants of clear evenings, and prove great reliefs amidſt the gloom of the long winter nights. They commonly appear at twilight near the horizon, of a dun colour, approaching to yellow; ſometimes continuing in that ſtate for hours, without any ſenſible motion; after which they break out into ſtreams of ſtronger light, ſpreading into columns, and altering ſlowly into ten thouſand different ſhapes, varying their colours from all the tints of yellow to the obſcureſt ruſſet. They often cover the whole hemiſphere, and then make a moſt brilliant appearance; their motions at this time are amazingly quick, and aſtoniſh the ſpectator with the rapid change of their form. *Mr. Winn*, in his account laid before the Royal Society in 1772, ſays, that the appearance of an Aurora Borealis is a certain ſign of a hard gale of wind from the ſouth or ſouth-weſt. This he never found to fail in 23 inſtances, and thinks, that from the ſplendour of the meteor, ſome judgment may be formed concerning the enſuing tempeſt. If the aurora is very bright, the gale will come on within 24 hours, but will be of no long duration; if the light is faint and dull, the gale will be leſs violent, and longer in coming on, but will alſo laſt longer. Theſe obſervations were made in the Engliſh Channel, where ſuch winds are very dangerous, and by attending to the Aurora Borealis, he ſays he often got eaſily out of it, when others narrowly eſcaped being wrecked. This is an uſeful obſervation for ſailors: but it cannot be expected that the winds ſucceeding theſe meteors ſhould in all places blow from the ſouth-weſt: though no doubt, a careful obſervation of what winds ſucceed the Aurora Borealis and other meteors, in different parts of the world, might contribute, in ſome meaſure, to leſſen the dangers of navigation.

1571 The Iſland of Cyprus taken by the Turks.

1572 A new *ſtar* in Caſſiopeia obſerved by *Cornelius Gemma.* It appeared in November and diſappeared in March.

1579 The Dutch ſhake off the Spaniſh yoke, and the Republic of Holland begins.

—— The Engliſh Eaſt India Company incorporated.

—— The Turky Company incorporated.

1580 *Sir Francis Drake* returns from his voyage round the world, being the firſt Engliſh circumnavigator.

1583 The firſt propoſal of ſettling a colony in America.

1588 The Spaniſh *Armada* deſtroyed by Drake and other Engliſh Admirals.

1590 *Teleſcopes* invented by *Janſen*, a ſpectacle maker in Germany. In this it may be ſaid a lucky incident effected, what philoſophy might have ſought for in vain. The children of Janſen being at play in their father's ſhop, happened by chance to place a convex and concave glaſs in ſuch a manner, that in looking through them at the weather-cock of the church, it appeared to be nearer, and much larger than uſual; the ſurprize they expreſſed at this circumſtance exciting their father's curioſity, he examined the object himſelf, and finding what the children ſaid to be true, improved the hint, by fixing the glaſſes upon a board, that they might be always ready for obſervation. When *Galileo* heard of the diſcovery he fixed the glaſſes into a tube, which made the diameter of objects appear 3 times greater than to the naked eye; at his next trial he magnified the object 8 times, and ſoon after this 30 times, which is nearly the greateſt perfection this kind of teleſcope is capable of.

1595 *Tycho Brahe*, a noble Dane and great Aſtronomer flouriſhed. Though the refractive power of the atmoſphere appears to have been known to the ancients, he was the firſt who determined its effects, and employed it in correcting aſtronomical obſervations; but *Deſcartes* is ſuppoſed to be the firſt who publiſhed, that the ſines of the angles of incidence and refraction are in a given ratio. The refraction of light at the ſurfaces of tranſparent bodies may be illuſtrated by the following experiment. Place a piece of money at the bottom of a baſon, and retire to ſuch a diſtance, that the edge of the baſon ſhall juſt hide it from your ſight; then let another perſon fill the baſon gently with water; and as before you could not ſee the piece of money where it was, you will now ſee it where it is not: it is not your eye that has changed place, but the ray of light has taken a new direction in paſſing from the water to the eye, and ſtrikes it, as if it came from the piece of money. By this experiment it appears, that objects can ſeldom be ſeen in their true places, and that the eye is no leſs ſubject to error than the reſt of our ſenſes. In conſequence of this property of refraction, we enjoy the light of the ſun whilſt he is yet below the horizon, and by it is produced the morning and evening twilight.

1596 *Kepler*, a German, was the firſt who proved that the planets revolved in elliptical orbits, the ſun being in one of the foci, and that the velocities are ſuch, that a line drawn from the ſun to a planet, and ſuppoſed to move with it, will deſcribe equal areas in equal times.

1596 *Kepler* ſeems to have been the firſt who ſuppoſed, that the colours of the *rainbow* might ariſe from the refraction of the ſun's rays upon entering the drops of falling rain. This theory was enlarged by *Antonio de Dominis* and others; but as they were ignorant of the true cauſes of colour, they left the taſk unfiniſhed for *Newton* to complete. Of the various meteors, the rainbow is one of the moſt pleaſing; its colours not only delight the eye with the mildneſs of their luſtre, but encourage the ſpectator with the proſpect of ſucceeding ſerenity. It is only to be ſeen when the ſpectator turns his back to the ſun, and when it rains on the oppoſite ſide. Its colours beginning from the under part, are *violet*, *indigo*, *blue*, *green*, *yellow*, *orange* and *red*, ſo that it contains all the beautiful and ſimple ſhades of the priſm. Without the firſt bow, there is often an external one, whoſe colours are leſs vivid and ranged in an oppoſite order. Sometimes we ſee half a bow, at other times a whole one, and from ſome high mountains as the Andes, in America, inſtead of a ſemi-circular arch, is frequently ſeen a complete ring of this beautiful meteor. Though the rainbow is generally formed by the reflection of the ſun's light from the rain, it frequently appears among the waves of the ſea, whoſe tops are blown by the wind into ſmall drops; it is ſometimes to be ſeen on the ground when the ſun ſhines on a very thick dew; and likewiſe by moonlight, though ſeldom vivid enough to render the colours diſtinguiſhable.

1599 *Edward Wright*, a native of *Gaveſton*, in *Norfolk*, was the firſt who ſhewed how to conſtruct a true ſea chart, and explained the principles on which it is founded. He alſo was the firſt who undertook that difficult, but uſeful work, by which the New River is brought from near Ware, in Hertfordſhire, to ſupply the city of London with water: but by the tricks of others this modeſt and ingenious man was hindered from compleating the work he had begun.

1602 Decimal Arithmetic invented at Bruges.

1603 The Crowns of England and Scotland united by James the firſt.

1608 Colonies ſent from England to Virginia.

1610 *Galileo*, an Italian, about this time inveſtigated the laws of falling bodies, proved that the curve deſcribed by a cannon ball would be that of a parabola, diſcovered by a teleſcope that the moon's face appeared full of cavities reſembling vallies, that the ſun had dark ſpots on his ſurface, that Jupiter was attended by 4 moons, that the phaſes of Venus appeared like the monthly phaſes of the moon, &c. But for theſe diſcoveries he was ſummoned before the Inquiſition as a man of the moſt obnoxious and dangerous principles, and compelled ſolemnly to deny the truth of them. A venerable old man who had enlightened Europe by his diſcoveries, to be upon his knees before an aſſembly of haughty, ignorant bigots, renouncing by their compulſion thoſe truths which nature and his own conſcience affirmed to be incontrovertible, was a ſpectacle that cannot be thought of without indignation.

1610 *Thermometers* invented by *Diebel*, a Dutchman. The thermometer is an inſtrument to meaſure the degree of heat in the air and other bodies, by the expanſion and contraction of different ſubſtances; that moſt commonly uſed is quickſilver, which expands with heat and contracts with cold.

1612 The north-weſt paſſage to China attempted in vain by the Engliſh.

1614 *Napier*, of Marcheſton, in Scotland, invents the logarithms.

1620 Barbadoes diſcovered by Sir William Courteen.

1621 New England planted by the Puritans.

—— *Microſcopes* appear to be firſt uſed in Germany about this time, and are ſuppoſed to be invented by Janſen and his ſons. A microſcope is an inſtrument for viewing ſmall objects, and rendering thoſe viſible which would be otherwiſe imperceptible. It enables us to examine the ſtructure of plants and animals; opens to the curious an exhauſtleſs ſource of information and pleaſure; and furniſhes the philoſopher with an unlimited field of inveſtigation.

1631 The tranſit of Mercury over the ſun's diſk firſt obſerved by *Gaſſendi*.

1633 Louiſiana diſcovered by the French.

1635 Province of Maryland planted by Lord Baltimore.

—— *Norwood*, an Engliſhman, was the firſt who accurately meaſured the circumference of the earth, and found a degree of a great circle to contain ſomething more than 69 $\frac{1}{2}$ Engliſh miles.

1639 A tranſit of Venus over the ſun's diſk, firſt obſerved by *Mr. Horrox*, November 24th, Old Stile, 3 h. 15 m. P. M.

1642 *Taſman* diſcovered the Southern Coaſt, or point of New Holland, which he called Van Diemen's Land.

1643 *Barometers* invented by Torricelli. The barometer is an inſtrument for meaſuring the weight of the atmoſphere, and of uſe in foretelling the changes of the weather, and alſo for meaſuring the height of mountains. The uſual ranges of the mercurial column in our latitude are between 28 and 31 inches, of which 29½ is the uſual ſtation in variable weather, when there is a mixture of ſhowers and ſunſhine.

General rules for judging of the weather by the Barometer.—When the mercury ſinks, the air is light, will let fall its vapours and give us rain. But when it riſes, the air is then heavier, will be able to ſupport the vapours, and we ſhall have fair weather. If it ſinks in a froſt we may expect ſnow or a thaw. When it riſes in winter we expect a froſt, eſpecially if the wind is in the north or eaſt. If it ſinks gradually we may expect the rain will be laſting. If it riſes gradually, there will be a continuance of fair weather. When it fluctuates, riſing and falling by turns, and that ſuddenly, the weather is generally unſettled, and for the moſt part continues ſo for ſome time. If it falls very low, there will be much rain. If ſuddenly, a very high wind. If loweſt of all, a ſtormy and tempeſtuous wind. But if ſuch an extraordinary fall happens without any remarkable alteration at hand, there muſt be ſtorms at a diſtance. In very hot weather the falling of the mercury foretells thunder. If it falls while it rains, it will be likely to rain the next day. If the ſurface of the mercury is convex, it is a ſign of its riſing. If concave, it is then ſinking. The deſcent of the mercury is not always a ſign of approaching rain, becauſe it often falls very much for a wind; nor is its riſing a certain ſign of fair weather, particularly if the wind be northerly or eaſterly, in which caſe it often ſtands high, by reaſon of the coldneſs and denſity of the air, though it is all the while rainy weather. When fine weather is laſting, with a weſterly wind, the mercury frequently reſts a little above changeable.

1648 A new ſtar obſerved in the tail of the whale by *Fabricius.*

1649 Pendulums firſt applied to clocks by *Huygens.*

1652 The Dutch Colony at the Cape of Good Hope eſtabliſhed.

1654 The *Air Pump*, invented by *Otto Guericke*, of Magdeburg. It is one of the moſt uſeful inſtruments we have for inveſtigating the properties of the air, which are many and wonderful. The atmoſphere is found to preſs with a force of 15lbs. weight upon every ſquare inch, or 2160lbs. on every ſquare foot of the earth's ſurface. Great as this preſſure is, ſounds, ſmells, &c. travel through it with great rapidity; and though our bodies ſupport a weight of nearly 2 tons, yet, the removal thereof would prove the cauſe of immediate death.

1655 The Engliſh, under Admiral Penn, take Jamaica from the Spaniards.

—— *Huygens* was the firſt who diſcovered Saturn's Ring, and his fourth ſatellite; the fifth and firſt three were not diſcovered till ſeveral years afterwards: and the ſixth and ſeventh have been lately diſcovered by Dr. Herſchel.

1663 Carolina planted.

—— Pruſſia declared independent of Poland.

1665 The Magic Lantern invented by *Kircher*; it is an optic machine, whereby little painted images are repreſented ſo much magnified, as to be accounted the effect of magic by the ignorant.

1669 The iſland of Candia taken by the Turks.

1670 The Hudſon's Bay Company incorporated.

1672 The African Company eſtabliſhed.

—— *Richer*, a Frenchman, obſerving at Cayenne, an Iſland on the coaſt of Guiana, that his pendulum clock, which had been regulated at Paris to the mean motion of the ſun, loſt at this iſland 2′ 28″ every day; and at his return publiſhed the diſcovery: *Sir Iſaac Newton* ſoon found that it proceeded from a diminution of gravity, and proved that the earth was not truly ſpherical, but an oblate ſpheroid, or flatted at the poles, and that the axis and diameter of the earth are to each other as 229 to 230, which has ſince been confirmed by mathematicians ſent from France to meaſure a degree of the meridian at Lapland and Peru, which was accompliſhed in the year 1736.

1675 *Roemer*, a Dutch Philoſopher, was the firſt who diſcovered (by obſerving the eclipſes of Jupiter's moons) that light is about 8 minutes in its paſſage from the ſun to the earth, which is near 195 thouſand miles in one ſecond of time: how different is this motion from that of ſound, which travels no more than 1142 feet in a ſecond, whether it be loud or low, grave or acute, all moving equally ſwift, the ſofteſt whiſper making equal ſpeed with the noiſe of a cannon, or the loudeſt thunder!—As light may be ſaid to be inſtantaneous and ſound progreſſive, we have an eaſy *rule for finding how far a thunder cloud, &c. is off.*—Multiply the number of ſeconds obſerved between ſeeing the flaſh and hearing the ſound by 1142, and you have the diſtance in feet; which may be eaſily turned into yards, furlongs or miles.

1677 The *Micrometer* invented by *Kircher*. By this inſtrument, the apparent magnitudes of objects viewed through teleſcopes or microſcopes are meaſured with great exactneſs.

1680 A great *comet* appeared, and from its nearneſs to our earth, alarmed the inhabitants. It continued viſible from Nov. 3d to March 9th.

1686 The *Newtonian Philoſophy* publiſhed. Every ſcience upon which *Sir Iſaac Newton* employed his attention, received a new form from his hands, and was carried to a degree of perfection unlooked for by the ancients. In the courſe of a few years he deſtroyed the works of ages, and erected an edifice of his own, that will be as durable as the fabric of nature itſelf. Algebra, Geometry, Mechanics, Optics, Chronology, Philoſophy, and Aſtronomy, began now to aſſume an unuſual ſplendour and dignity, and by his improvements and diſcoveries, were rendered prodigiouſly more extenſive and important. The method of fluxions in particular was entirely his own invention; and this alone was ſufficient to have made his name immortal. The exquiſite ſubtlety of this doctrine is ſuch, that the powers of the human mind ſeem inadequate to a higher purſuit. Any thing beyond it muſt be the ſcience of pure intelligence.

1688 The *Revolution* in Great Britain begins Nov. 5th. King James abdicates and retires to France, December 3d.

1691 The obliquity of the ecliptic obſerved by Flamſtead to be 23° 28′ 32″.

1692 Hanover made an Electorate of the Empire.

1701 Pruſſia erected into a Kingdom.

1702 The French ſent Colonies to the Miſſiſippi.

1704 Gibraltar taken from the Spaniards by Admiral Rooke.

1706 The Treaty of Union between England and Scotland ſigned July 22.

1710 The Engliſh South Sea Company began.

1718 Sardinia erected into a kingdom and given to the Duke of Savoy.

1727 Ruſſia, formerly a Dukedom, is now eſtabliſhed as an Empire.

—— The aberration of the fixed ſtars diſcovered and accounted for by *Dr. Bradley*.

1736 A tranſit of Mercury obſerved by *Caſſini*.

1744 *Commodore Anſon* returns from his voyage round the world.

1746 *Lima* deſtroyed by a moſt tremendous earthquake.

1749 The Colony of Nova Scotia founded.

1752 The *Julian Year* was uſed by the Engliſh till this time, when they reformed their account, by ordering, that the 3d of September ſhould be reckoned the 14th, and *Biſſextile*, or *Leap Year* to take place as uſual: by this regulation the year nearly correſponds with the Gregorian Year.—*To find when Leap Year happens.*—Divide the given year by 4; if 0 remains, it is

Leap Year; if 1, 2, or 3 remains, it is ſo many years after.

1752 *Dr. Franklin* is ſuppoſed to have thought of defending buildings from the effects of lightning, by fixing long pointed rods of iron or other metal againſt them, extending 2 or 3 feet above the building, and as many below it, into the ground. In a thunder ſtorm, when any highly electrified cloud approaches ſo near to the earth as to exchange powers with it, damage is done to thoſe things through which the exchange is made; if there happens to be a houſe furniſhed with a conductor directly between that part of the cloud and the earth where there is the greateſt effort for reſtoring an equilibrium of powers, the conductor will be ſtruck, and will probably prevent the building from receiving any injury; if there be no conductor, the lightning will paſs to the ſame place, and the building will probably be damaged, becauſe the materials reſiſt the paſſage of the electrical powers.

A conductor appears to have very little power of attracting lightning a few feet out of the direction it would chooſe of itſelf, as is evident from the accidents that happened to the magazine at *Purfleet*, in *Eſſex*, and the Houſe of Induſtry, at *Heckingham*, in *Norfolk*, though they were well furniſhed with pointed conductors. Hence we may conclude, that the effect of them, in general, is too inconſiderable either to leſſen fear or animate hope.

Lightning and the electrical matter appear to be the ſame; the former is in the hands of nature, what the latter is in ours; the wonders in electricity are little imitations of thoſe great effects, which frighten and

alarm

alarm us. When lightning is attended with thunder, well defined, and has a zig-zag form, making angles like the letter V, it is dangerous; but the moſt formidable and deſtructive form it is ever known to aſſume, is that of *balls of fire*, and wherever they fall, much miſchief is the reſult of their exploſion. The colour of lightning is conſidered as an indication of its power to do miſchief, the paleſt and brighteſt flaſhes being reckoned the moſt deſtructive. That ſpecies, whoſe flaſhes are indiſtinct, and whoſe form cannot be eaſily obſerved, is ſeldom known to do much hurt, and ſuch as is ſeen playing among the clouds in a ſummer's evening without thunder, is quite inoffenſive. It is very remarkable, that no two flaſhes of lightning are exactly ſimilar to each other.

1754 A dreadful eruption of Mount Ætna.

1755 *Liſbon* deſtroyed by an earthquake, Nov. 1.

1756 146 Engliſhmen were confined in the black hole, at Calcutta, by order of the Nabob, and 123 found dead the next morning.

1760 A tranſit of Venus over the ſun, June 6.

1766 April 21ſt, a ſpot or macula of the ſun, more than thrice the bigneſs of our earth, paſſed the ſun's center.

1771 *Lieutenant Cook*, *Dr. Solander*, and *Mr. Banks*, in his Majeſty's ſhip the Endeavour, return from a voyage round the world, having made ſeveral important diſcoveries in the ſouth ſeas.

1773 *Captain Phipps* is ſent to explore the North Pole, but having made 81 degrees, is in danger of being locked up by the ice, and his attempt to diſcover a paſſage in that quarter proves fruitleſs.

1774 *Captain Cook*, in his Majeſty's ſhip the Reſolution, returns from a voyage to the Southern Ocean, which he traverſed without finding a ſouthern continent.

1776 *Captain Cook*, ſailed in the Expedition to determine whether Aſia and America were connected, or whether there was a poſſibility of ſhortening the paſſage to the Eaſt Indies by ſailing round the northern parts of the Continents of Europe and Aſia; in this voyage he loſt his life, and the ſhip returned without finding the deſired paſſage.

1779 A moſt extraordinary eruption of Veſuvius, Aug. 8.

1780 January 14th, 6 hours A. M. the thermometer ſuſpended in the open air at Glaſgow ſtood at 46° below 0.

—— Dreadful hurricanes in the Weſt Indies, by which great devaſtation is made in Jamaica, Barbadoes, St. Lucia, Dominica, and other iſlands, October 3d and 10th.

1781 *Dr. Herſchel* added a new planet to our ſyſtem, which he diſcovered in the night of March 13th, and ſince that time has found it to be attended by two moons: he has alſo added two more ſatellites to the planet Saturn, doubled his ring, and found that the atmoſphere of the moon extends about 25 miles above its ſurface. From the wonderful powers of his teleſcope, the heavens have, as it were, increaſed under his eye; and 44,000 ſtars, ſeen in the ſpace of a few degrees, ſeem to indicate that 75 millions may be diſcovered in the expanſe expoſed to human inveſtigation.

—— A bloody engagement between the Dutch and Engliſh fleets near the Dogger Bank, Aug. 5th.

1782 Minorca ſurrendered to the Spaniards, Feb. 5th.

—— The French fleet under De Graſſe defeated and almoſt deſtroyed by Admiral Rodney, April 12th.

—— The Spaniſh floating batteries before Gibraltar entirely deſtroyed, Sept. 13th.✓

1783 Preliminaries of a general peace ſigned, and *America* declared independent, January 20th.

—— Three earthquakes in Calabria Ulterior and Sicily, deſtroying a great number of towns and inhabitants, February 5th, 7th and 28th.

—— The firſt *Air Balloon* let off in Paris by *M. Montgolfier*, Aug. 27th.

—— The ſun obſcured by a kind of fog during the whole ſummer.

—— A *Volcanic Eruption*, in Iceland, ſurpaſſing any thing recorded in hiſtory. The lava ſpouted up in three places to the height of two miles perpendicular, and continued thus for two months; during which time it covered a tract of 3600 ſquare miles, in ſome places more than 100 feet deep.

—— A large *Meteor* appears to the northward of Shetland, and takes its direction ſouthward, with a velocity little inferior to that of the earth in its annual courſe round the ſun. Its tract obſerved for more than 1000 miles.

1789 Revolution in France, capture of the Baſtile, execution of the Governor, &c. July 14th.

1790 Grand Confederation in the Champ de Mars, July 14.

1792 The definitive treaty of peace was ſigned between the Britiſh and their allies, the Nizam and Mahrattas on the one part, and Tippoo Sultan on the other, March 19th, by which he ceded one half of his territorial

ritorial poſſeſſions, and delivered up two of his ſons to Lord Cornwallis, as hoſtages for the fulfilment of the treaty.

—— A dreadful maſſacre at the Palace of the Thuilleries, in Paris, Aug. 10th.

—— The priſoners in Paris murdered by the mob, Sept. 2d and 3d.

1793 Lewis 16th, King of France, after having received innumerable indignities from his people, was brought to the ſcaffold, Jan. 21ſt. and had his head ſevered by the guillotine, contrary to the expreſs laws of the new conſtitution, which had declared the perſon of the King inviolable.

—— The Republic of France declares war againſt England in February.

—— Toulon taken poſſeſſion of by Lord Hood in Auguſt, but evacuated in December.

—— Marie Antoinette, Queen of France, guillotined.

1794 The French fleet totally defeated by Earl Howe, June 1ſt.

QUESTIONS.

The following Queſtions nearly recapitulate the principles of Geography, Aſtronomy, and the Uſe of the Globes, contained in this Treatiſe; and are ſelected as leſſons to exerciſe the genius of the induſtrious and inquiſitive Student.

GEOGRAPHY.

DEFINITIONS & PRINCIPLES.

1 WHAT is Geography, how long is the circumference and diameter of the earth, and how many times is the latter contained in the former?

2 How many motions has the earth, what are they called, and in what time are they performed?

3 What are the conſtituent parts of the Globe, how many ſquare miles are there on its ſurface, and how much land and water?

4 Name and deſcribe the natural diviſions of land.

5 Name and deſcribe the natural diviſions of water.

6 By what means do Geographers determine the diſtances and ſituations of places on the globe?

7 About what line is the diurnal motion of the earth performed, and what are its extremities called?

8 What is the difference between a greater and a leſſer circle as drawn on the globe, and how are all circles divided?

9 What is the equator and ecliptic, over which does the ſun paſs in a year, and what are the vernal and autumnal equinoxes?

10 What lines are thoſe which divide the globe's ſurface into the northern and ſouthern, and alſo into the eaſtern and weſtern hemiſpheres?

11 What lines are thoſe which repreſent the north, ſouth, eaſt and weſt points of the compaſs, or horizon?

12 What diſtance are the tropics and polar circles from the equator and poles, and from each other?

13 What is meant by latitude and longitude, and from whence are they reckoned?

14 What is the diſtance of the zenith and nadir from the horizon, and when are the heavenly bodies ſaid to riſe and ſet?

15 Into how many points is the mariner's compaſs divided, and what is meant by the bearing of one place from another?

16 How many zones are there, and what are their names, breadths and boundaries?

17 What continents, iſlands, oceans and ſeas are ſituated in the torrid or burning zone, the moſt fertile and luxuriant, though hotteſt diviſion on the globe?

18 Name the continents, iſlands, oceans and ſeas, that are in the temperate zones, the pleaſanteſt parts of the earth's ſurface.

19 What countries are ſituated in the frigid zones, the moſt miſerable parts of the globe's ſurface, where every thing is frozen while the ſun remains under the horizon?

20 What are climates, how many are there, and how are they reckoned?

21 By what names did the ancients diſtinguiſh the inhabitants of the earth?

22 Which way do the ſhadows of the inhabitants of the torrid, temperate and frigid zones fall at noon?

23 What do you mean by periæci, antœci and antipodes?

24 On what part of the globe muſt a perſon be ſituated to ſee the ſtars in both hemiſpheres, and what ſphere will he be in?

25 In what ſphere are thoſe people ſaid to live who are between the equator and poles, and what is peculiar to their ſituations?

26 Where muſt a perſon be ſituated to have but one day and night in the year, what ſphere will he inhabit, and what part of the heavens will be viſible to him?

27 What are maps and charts, and what are the advantages and diſadvantages of a map projected ſtereographically?

28 What parts of a map repreſent the four cardinal points, and how is latitude and longitude reckoned upon it?

29 How are ſea-coaſts, rivers, mountains, foreſts, lakes, cities, &c. repreſented in maps?

The

The GRAND DIVISIONS *of* LAND.

30 What are the names of the greater and leſſer continents on the globe, and how are they politically divided?

31 In what hemiſphere and zone is *Europe* ſituated, how is it bounded, what is its length and breadth, and how many inhabitants does it contain?

32 How many empires are there in Europe, and what is the name of the chief city belonging to each?

33 How many kingdoms are there in Europe, and what is the name of the chief city belonging to each?

34 How many republics, ſtates and provinces are there in Europe, and what is the name of the chief city belonging to each?

35 Where are the King of Pruſſia's dominions ſituated, and how is Germany, Flanders and Italy divided?

36 What is the nature of the climate, air and ſoil, in Europe, and what are its natural productions?

37 What is the religion and character of the Europeans?

38 Name the principal mountains and volcanoes in Europe.

39 What are the names of the moſt remarkable rivers in Europe, and which runs the longeſt courſe?

40 What iſlands belong to the King of Denmark, and where are they ſituated?

41 What iſlands are ſituated in the Baltic Sea, and to whom are they ſubject?

42 Name the iſlands ſituated in the Mediterranean Sea, and to whom they belong.

43 Where are thoſe iſlands ſituated which form part of ancient and modern Greece, and to whom are they ſubject?

44 What is the name of the largeſt iſland belonging to Europe, how is it divided, and by whom inhabited?

45 How many counties, cities and univerſities are there in England, Scotland and Wales, and when were the two latter united with the former?

46 What is the nature of the climate, ſoil, and face of the country in Great Britain?

47 What is the eſtabliſhed religion and government in England, Scotland and Wales?

48 What are the King of England's prerogatives and principal courts of judicature?

49 How many Peers and Commoners are ſent from Scotland to ſit in the Britiſh Parliament, and how many Members are there in the Houſe of Commons?

50 What are the names of the counties and cities contained in the Home and Norfolk Circuits?

51 Name the counties and cities in the Oxford and Midland Circuits.

52 How many counties and cities are there in the Weſtern and northern circuits?

53 What are the names of the circuits, counties and cities belonging to North Wales?

54 How many circuits, counties and cities are there in South Wales?

55 Why are the counties of Middleſex and Cheſhire not included in the circuits?

56 Name the largeſt and ſmalleſt counties in England and Wales, and thoſe that ſend the greateſt and leaſt number of Members to Parliament.

57 Name the principal commercial companies eſtabliſhed in England?

58 How many ſhips are ſuppoſed to be employed in the commerce of England, and what are its exports and imports reckoned to be?

59 What are the natural productions and principal manufactures in Great Britain?

60 What is the military and marine force of the kingdom of England in time of peace, and what has it been in time of war?

61 Where are the foreign poſſeſſions of the King of England ſituated?

62 In what hemiſphere and zone is *Aſia* ſituated, how is it bounded, what is its length and breadth, and how many inhabitants does it contain?

63 Name the principal regions and cities in Aſia.

64 What is the length, breadth and height of the wall which was built 1800 years ago, to ſeparate China from Tartary?

65 In what part of Aſia did the various tranſactions recorded in the ſcriptures happen?

66 What is the nature of the air and ſoil in Aſia, and what are its natural productions?

67 What is the character, religion and government of the Aſiatics?

68 Name the principal mountains in Aſia, and deſcribe ſuch as are very remarkable.

69 What are the names of the chief rivers in Aſia, and on which are the Engliſh factories ſituated?

70 What iſlands belong to Aſia in the Northern Ocean?

71 Name the chief groups of iſlands that are ſituated in the Eaſtern Ocean, and deſcribe ſuch as are very remarkable.

72 What iſlands are ſituated in the Indian Ocean, and on which have the Engliſh and Dutch their factories?

73 What is generally called the Eaſt Indies, and what nations trade there?

74 In what hemiſphere and zone is Africa ſituated, how is it bounded, what is its length and breadth, and how many inhabitants does it contain?

75 Name the principal regions and cities known in Africa.

76 What are the principal kingdoms on the coaſt of Barbary, how is Guinea diſtinguiſhed, and what parts of Africa do the Portugueſe and Dutch claim?

77 What is the character, religion and government of the Africans?

78 What is the nature of the ſoil in Africa, and what are its natural productions?

79 Name the principal mountains in Africa, and deſcribe ſuch as are very remarkable.

80 What are the chief rivers in Africa, and on which have the Europeans their ſettlements?

81 What iſlands are there in the Indian Ocean that belong to Africa, and near which do the European ſhips paſs in their way to Bombay, in the Eaſt Indies?

82 Where is the iſland of St. Helena ſituated, and to whom does it belong?

83 Where are the Cape Verd Iſles ſituated, what is their number, and to whom are they ſubject?

84 Where are the Canary Iſlands ſituated, what do they produce, and to whom are they ſubject?

85 Where are the Madeiras (ſo much frequented by ſhips to and from India) ſituated, what do they produce, and to whom are they ſubject?

86 Name thoſe iſlands that are at an equal diſtance from Europe, Africa and America.

87 In what hemiſpheres and zones is *America* ſituated, how is it bounded, what is its length and breadth, and how many inhabitants does it contain?

88 What is the length and breadth of the Iſthmus of Darien, that joins the two peninſulas together?

89 What diſtance is North and South America from London?

90 What are the principal countries and cities in North America, and to whom do they belong?

91 What are the principal countries and cities in South America, and by whom are they claimed?

92 What is the religion of the Indians in America, and what is their manner of living?

93 What is the nature of the air and ſoil in America, and what are its natural productions?

94 Name the principal mountains in America, and deſcribe ſuch as are very remarkable.

95 Name and deſcribe the principal rivers in North and South America.

96 Where are the Summer Iſlands and Newfoundland ſituated, and what diſtance are they from England?

97 In what form do the Weſt India Iſlands lie, how are they divided and diſtinguiſhed?

98 Deſcribe the Bahama or Lucay Iſlands.

99 Name the Great and Little Antilles.

100 Name the Leeward and Windward Iſlands.

101 Where are the Weſt India Iſlands ſituated, how are their ſeaſons diſtinguiſhed, and what are their productions?

102 What iſlands are ſituated round South America, and to whom do they belong?

103 In what part of the world is the newly diſcovered inland ſea ſituated?

104 Where is the Northern Archipelago ſituated, and by whom was it diſcovered?

105 Where are the Sandwich, Marqueſas, and Society Iſlands ſituated, and on which did Captain Cook loſe his life?

106 Where are the New Hebrides, New Holland and the Friendly Iſles ſituated?

107 Deſcribe New Holland, New Guinea and New Britain, and give an account of their inhabitants.

108 Which of the continents is ſurrounded by the moſt valuable, and greateſt number of iſlands?

109 In comparing the ſituation, extent, climate, productions, population, government, &c. of Europe, Aſia, Africa and America with each other, which has the pre-eminence?

110 What parts of the earth's ſurface were known to the ancients?

111 In what century were the Eaſt Indies, China and Japan diſcovered by the Europeans?

112 When was America diſcovered, by whom, and on what occaſion?

113 Who were the principal circumnavigators of the globe, and who was the firſt man that attempted to ſail round it?

114 What parts of the continents are leaſt known to Europeans, and what proportionable part of the habitable ſurface of the earth remains to be explored?

The GRAND DIVISIONS of WATER.

115 What is the ſituation and extent of that part of the globe's ſurface, called water?

126 What obſervations have you to make on the tides, currents and other motions, to which the water in the general ocean is ſubject?

117 What is the wind, its height and velocity, deſcribe ſuch as are general, periodical and variable, and on what parts of the globe are they moſt violent and alarming?

118 Into how many parts is the general ocean divided, what are their names, and how many great rivers are ſuppoſed to fall into them?

119 Deſcribe the boundary, extent and different parts of the Northern Ocean.

120 What is the width and boundary of the Atlantic Ocean,* and over what part of it do the general trade winds blow?

121 What is peculiar to the Baltic and Mediterranean ſeas, where are the Falls of Niagara ſituated, and what part of the Atlantic Ocean is ſubject to calms?

122 What are the principal ſeas, gulphs, bays, lakes and rivers that communicate with the Atlantic Ocean?

123 What is the greateſt width and boundary of the Pacific Ocean, what ſeas, gulphs and bays, belong to it, and over what part of this ocean do the conſtant trade winds blow?

124 How is the Indian Ocean bounded, in what part of it are the monſoons, or ſhifting trade winds found, how long do they continue, and in what direction do they blow?

125 What ſeas, gulphs and bays are conſidered as belonging to the Indian Ocean, and at what time of the year do the changing or breaking up of the monſoons happen?

126 How is the Southern Ocean bounded, what part of it has been navigated, and can any reaſon be aſſigned why it is colder than the Northern Ocean?

127 On which ſide of the equator is moſt water, which way do the great promontories or capes point, and what is the opinion of Geologiſts concerning an alternate flux of water from pole to pole?

128 Why is the climate at the weather-beaten Cape of South America ſo ſevere as ſcarcely to admit of any human inhabitants; though no nearer to the ſouth pole than the northern counties of England are to the north pole?

ASTRONOMY.

DEFINITIONS & PRINCIPLES.

1 What is Aſtronomy, and what is the opinion of Aſtronomers concerning the Univerſe?

2 What is meant by the fixed and wandering ſtars, and what are primary, ſecondary and cometary planets?

3 What are the names of the lines, circles and ſpaces invented by Aſtronomers to aſcertain the ſituation of the ſtars and planets?

4 How many motions have the planets, and what is the reaſon that the apparent motion of the ſun is not equal?

5 How many times in the year do a well-regulated clock and a ſun-dial, ſhew the ſame time of the day, and when are they before each other?

6 What is the greateſt and leaſt diſtance of a planet from the ſun called?

7 What is meant by the mean motion, and mean diſtance of a planet from the ſun?

8 What is the greateſt and leaſt diſtance of a planet from the earth called?

9 When is a planet ſaid to be in its node, in conjunction, and in oppoſition?

10 When is the motion of a planet ſaid to be direct, ſtationary and retrograde?

11 What is the declination, latitude and longitude of a ſtar or planet?

12 What do you mean by the amplitude and azimuth of any celeſtial object?

13 What are vertical circles, and what is meant by the altitude and zenith-diſtance of an object?

14 What is to be underſtood by oblique and right aſcenſion, and the aſcenſional difference of any object?

15 What is the elongation of a planet, and what is meant by its heliocentric and geocentric place?

16 Name the points of the compaſs.—When are the ſtars ſaid to riſe and ſet coſmically, achronically and heliacally?

17 What is meant by the aberration of the ſtars, and the parallax of a planet?

18 What is the difference between the tropical, ſiderial and julian years?

19 What is the difference between a periodical and a ſynodical month?

20 When is the moon ſaid to be in her ſyzigies and quadratures; and what is meant by the proceſſion of the equinoxes?

21 What is meant by the refraction of light, how long do we ſee the ſun every morning before it riſes above the horizon, and how long every evening after it ſets below it?

22 What is twilight, or crepuſculum, in what ſphere does it continue the longeſt, and how many degrees muſt the ſun deſcend below the horizon before it ends?

The SOLAR SYSTEM and FIXED STARS.

23 What is the ſolar ſyſtem, how many bodies does it contain, and what are the names of the ſuperior and inferior planets?

24 Deſcribe the known affections and properties of the ſun, the center of the ſolar ſyſtem.

25 What is known reſpecting Mercury, and how long is he to be ſeen in the heavens before the ſun riſes and after it ſets?

26 What is the magnitude and motion of the planet Venus, and what appearance does ſhe make in the heavens?

27 What is the diſtance of the earth from the ſun, how many miles does it move per hour in its orbit, and how many on its axis?

28 What are the properties of the earth's atmoſphere, and what will be the diameter of a globe formed of the earth and its atmoſphere?

29 What occaſions the viciſſitudes of the ſeaſons, when do they commence, over what part of the globe is the ſun at thoſe times, and when have we our longeſt and ſhorteſt days?

30 What is the difference between the length of the ſummer and winter half years, when have we day and night, and what is the cauſe of them?

31 What is the diameter of the moon and its diſtance from the earth, how long is it in revolving round the earth, and round its own axis?

32 What are the appearances of the moon to the inhabitants of the earth, in its revolution round it.

33 What is an eclipſe, when are the ſun and moon ſaid to be eclipſed, and what is the greateſt number of eclipſes of both luminaries that can happen in a year?

34 What is the magnitude of Mars, and what is his ſituation when he is miſtaken for a comet?

35 What is the magnitude of Jupiter, what are his belts, and with how many moons is he ſurrounded?

36 What proportion of light and heat is received by Saturn from the ſun, with what is he ſurrounded, and how many moons has he to attend him?

37 What is the magnitude and motion of the Georgium Sidus, and how many ſatellites revolve round it?

38 How are the planets to be diſtinguiſhed and pointed out in the heavens?

39 What are comets, what is known reſpecting them, and how many belong to the ſolar ſyſtem?

40 How are the ſtars diſtinguiſhed from the planets, what is their number and how are they claſſed?

41 How are the heavens divided by Aſtronomers, and how many conſtellations are there in each diviſion?

42 On what days of the year are the 12 ſigns of the zodiac entered by the ſun, and on what days do the equinoxes and ſolſtices happen?

43 What are the names of the moſt remarkable ſingle ſtars, what names have the moſt conſpicuous cluſters of them, and what diſtance is Sirius ſuppoſed to be from the earth?

44 How many ſtars are there of the firſt, ſecond, third, fourth, fifth and ſixth magnitudes, and how many may be ſeen by the naked eye in a clear froſty night in the northern hemiſphere?

45 What do you mean by unformed ſtars, nebulæ, and the via lactea, galaxy, or milky way?

46 By what forces or powers are the planets, ſatellites and comets, retained in their orbits, and kept revolving round the ſun?

The USE of the GLOBES.

1 What do you mean by the globes, what lines, circles and ſpaces are imagined to be drawn on their ſurfaces, and what other particulars belong to them?

2 What is the difference of latitude between the iſland of St. Helena and the Cape of Good Hope?

3 A ſhip from the latitude of 8° 28′ ſouth, has ſailed to the latitude of 6° 45′ north. Required the difference of latitude?

4 A ſhip from the iſland of Madeira ſails north 675 geographical miles: what latitude is ſhe in?

5 Three days ago we were in the latitude of the Cape of Good Hope, and have run each day 92 miles directly ſouth. What is our preſent latitude?

6 What is the difference of longitude between Cape Horn and Manilla?

7 Four days ago I departed from Cape St. Sebaſtian, in Madagaſcar, and I have made each day 75 miles of eaſt longitude: required the longitude the ſhip is in?

8 Suppoſe an Engliſh privateer falls in with a French ſhip of war in 36° 14′ north latitude, and 32° 40′ weſt longitude, in what ſea or ocean did they meet?

9 What places on the globe have the greateſt latitude and longitude, and where is that place ſituated, which has neither?

10 What is the bearing and diſtance of Peterſburgh from Madrid?

11 How many miles anſwer to a degree of longitude, in 56° of north or ſouth latitude?

12 There are two particular places on the earth which differ 60° in longitude, and are only 30 miles aſunder.

13 In what longitude is that place where the ſun roſe 3 hours before it did at London?

14 At 48 minutes after 6 in the afternoon I obſerved an eclipſe, which I knew was ſeen at the ſame inſtant of time at 25 minutes after 3 in the afternoon, at London: what was the longitude of the place where I made my obſervation?

15 What places on the globe are antœci, periæci and antipodes to Botany Bay, in New Holland?

16 When the ſun is over the equator, the earth is illuminated from pole to pole; how far will his rays extend beyond the north pole, when his declination is 10° north, and how far will they be withdrawn from the ſouth pole?

17 Over what place will the ſun be vertical on the 16th of March, when it is 10 o'clock in the morning at London?

18 What is the length of the longeſt and ſhorteſt day and night, at Boſton, in New England, and in what climate is that city ſituated?

19 How many days will the ſun conſtantly ſhine, and how many will he be abſent in the latitude of 80° north or ſouth?

20 On the 15th of November, at 8 o'clock in the evening, what places will have the ſun riſing, ſetting, noon, midnight and twilight?

21 At what time will twilight begin and end at the tropic of cancer on the 4th of June?

22 In 74 degrees of north latitude, on what day will conſtant twilight begin, and how long will it continue?

23 With the globe repreſent a right, oblique and parallel ſphere, and deſcribe the particulars belonging to each ſituation?

24 What is the altitude and azimuth of the ſun at Paris on the 10th of July, at 11 o'clock in the forenoon?

25 What is the meridian altitude, and amplitude of the ſun at Philadelphia on the 8th of September?

26 Suppoſe an eclipſe of the moon happens on the 25th of February, at 11 o'clock at night at London; on what places of the earth will it be viſible?

27 Repreſent the face of the heavens at Norwich on the 12th of January, at 10 o'clock in the evening.

28 What is the latitude and longitude of the Dog-ſtar, or Sirius, and when will it be on the meridian at 8 o'clock at night?

29 On the 21ſt of December when will the following ſtars come to the meridian, viz. Capella, Procyon and Aldebaran?

30 What will be the declination and right aſcenſion of Aldebaran on the 7th of June?

31 At Norwich, on the 10th of Auguſt, at what time will the following ſtars riſe and ſet, viz. Pollux, in Gemini, and Spica, near the left leg of Virgo?

32 At what time will the inferior planets riſe, culminate, and ſet at Norwich, on the 4th of January and the 8th of Auguſt?

33 At what time will the ſuperior planets riſe, culminate and ſet at Norwich on the 12th of May and the 16th of October?

34 Is Venus an evening or a morning ſtar on the 4th of March and the 15th of October?

CHRONOLOGY.

1 How many years are there from the creation of the world, and from the deluge, to this preſent year?

2 How many years are there from the Æra of the olympiads and the Æra of the building of Rome to this preſent year?

3 When did the four univerſal monarchies, as they are called, commence, viz. the Aſſyrian, under Ninus, ſon of Belus; the Perſian, under Cyrus; the Grecian, under Philip, of Macedon; and the Roman, under Romulus.

4 In what olympiad did the firſt eclipſe of the moon that is on record, happen?

5 In what olympiad did Leonidas defend the Streights of Thermopylæ?

6 What do you mean by the lunar cycle, and in what year of the cycle is 1794?

7 What is meant by the ſolar cycle, and in what year of the cycle is 1799?

8 How many years are elapſed ſince the defeat of Regulus, the Roman Conſul, in Africa?

9 When did Hipparchus begin his catalogue of ſtars, and when did the Gregorian, or New Stile, commence in England?

10 Are any of the following years, viz. 1794, 1796, 1817 and 1836, leap years?

11 When did the Romans invade Britain, and in what year was Caractacus carried in chains to Rome?

12 What notions had Pythagoras, Ptolemy and Copernicus reſpecting the ſolar ſyſtem?

13 In what year were the Saxons invited over to Briton, and when did the Danes invade England?

14 In what year were the fleets of Marcellus and Vitellius burnt by ſpeculums, and by whom?

15 In what year did Alfred the Great ſubdue the Daniſh invaders, and divide England into counties, hundreds, &c.?

16 In what year was England divided into circuits; and what King of England ſigned the deed ſo well known by the name of Magna Charta?

17 By whom was the mariner's compaſs invented, and what are the properties of the magnet or loadſtone?

18 If a cannon ball moves at the rate of 8 miles per minute, how long will it be in moving from the earth to the ſun?

19 What is an aurora borealis, and what uſe may be made of it in navigation?

20 By whom were teleſcopes invented and improved?

21 Who was the firſt that explained the principles, on which a true ſea chart, commonly called Mercator's chart, is conſtructed?

22 What philoſophical diſcoveries did Galileo make?

23 When were thermometers invented, and what is their uſe?

24 If the atmoſphere preſſes with a weight of 15 lbs. upon every ſquare inch of the earth's ſurface, and fired

gunpowder acts with a force 1000 times greater than the atmoſphere; with what force will the powder act upon a ſquare inch of a ball's ſurface when fired out of a cannon?

25 Who firſt accurately meaſured the circumference of the earth; and who proved it to be an oblate ſpheroid?

26 After obſerving a flaſh of lightning, it was 12 ſeconds before I heard the thunder; required the diſtance of the cloud from whence it came?

27 Who was the firſt that thought of protecting buildings from the effects of lightning, by means of metallic conductors: and what kind of lightning is reckoned the moſt dangerous?

28 In what year did the Revolution in Great Britain take place?

29 What is the obliquity of the ecliptic as obſerved by Flamſtead?

30 By whom was the aberration of the ſtars diſcovered and accounted for?

31 What are the principal diſcoveries made in aſtronomy by Dr. Herſchel?

32 In what year did the Heraclidæ, or deſcendants of Hercules return into Peloponneſus?

33 The hoſtilities between the Romans and Carthaginians are known in hiſtory by the name of the Punic Wars. The firſt happened 264 years before Chriſt, when did the ſecond and third commence, and in what year was Carthage raſed to the ground?

34 In what year was that diabolical tribunal the Inquiſition erected in Roman Catholic countries, for the examination and puniſhment of heretics?

35 What is the order of the colours in the rainbow, from whence do they proceed, and by whom were they explained?

36 By whom was the barometer invented, and what are the principal rules for judging of the weather by it?

37 Obſerving 7 pulſations of my wriſt between ſeeing the flaſh and hearing the report of a gun fired from a ſhip in diſtreſs; how far is ſhe off? allowing 70 pulſations to a minute, or $5\frac{1}{2}$ to a mile.

38 It has been found in our latitude, that the length of a pendulum, vibrating ſeconds, is $39\frac{2}{10}$ inches: by whom and in what year was this uſeful inſtrument applied to clocks?

39 In what year were the Spaniſh floating batteries before Gibraltar deſtroyed by General Elliot and his brave garriſon?

40 When did the Revolution in France take place, and in what year did the Republic declare war againſt England?

41 Name the memorable day and year when the French fleet was totally defeated by our brave Admiral, Earl Howe?

FINIS.

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